The conclusion drawn from the findings suggests that policies of both developed and developing nations show wide disparities in manufacturing, trade and use of pesticides. In developed nations, pesticide users are more educated about selecting the correct pesticides, following proper application and storage procedures. They can read the labels, and are knowledgeable of banned pesticides. Most of the pesticides are manufactured in developed nations and exported to developing nations. While in Nigeria and other developing nations, the situation is completely the opposite. There is high demand of pesticides to increase crop production, a much needed foreign exchange revenue for most developing nations. Most farmers are not educated and, therefore, cannot read labels and for those who could read the labels, the language becomes the hurdle.

FARM PESTICIDE POLICIES IN NIGERIA: A COMPARATIVE ANALYSIS OF SELECTED DEVELOPED AND DEVELOPING NATIONS

A DISSERTATION

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CHAPTER I

INTRODUCTION

Pesticides are substances or mixtures of substances intended for preventing, destroying, or controlling any pest. Pests include vectors of human or animal disease, unwanted species of plants or animals causing harm during or otherwise interfering with the production, processing, storage, transport, or marketing of food, agricultural commodities, wood and wood products, or animal foodstuffs. Pesticides may be administered to animals for the control of insects, arachnids or other pests in, or on their bodies. The term includes substances intended for use as a plant growth regulator, defoliant, desiccant, or the agent for thinning fruit or preventing the premature fall of fruit, and substances applied to crops either before or after harvest to protect the commodity from deterioration during storage and transport. In general, three major types of pesticides may be identified: herbicides are chemicals used for killing weeds or inhibit plant growth; insecticides are chemicals or mixtures of chemicals intended to destroy any insects that may destroy crops or gardens; and fungicides are chemicals used to destroy or inhibit fungi, which usually cause plant diseases (FAO 1986). Cremlyn (1991) defines pesticides as:

> Biologically active molecules deliberately introduced into the environment to control pests, or weeds. Such chemicals may interact with the ecosystem in a harmful way. Certain pesticides have caused environmental damage, particularly to birds of prey. Both governments and agrochemical companies realize that it is vital to protect the ecosystem from potential damage...

Pesticides are used as a quick remedy to the numerous problems relating to food production, especially in cash crop production, and in the control of endemic diseases like malaria, typhoid fever and trypanosomiasis. Thus, the use of pesticides is widely accepted as the most efficient and effective way of controlling pests and increasing agricultural harvest /yield. The effectiveness of pesticides has also led farmers to abandon alternative and indigenous methods of pest control creating total dependency on pesticides.

On the dangers and problems associated with pesticides, Rachel Carson (1962) noted:

> ...we have put poisonous and biologically potent chemicals indiscriminately into the hands of persons largely or wholly ignorant of their potentials for harm. We have subjected enormous numbers of people to contact with these poisons, without their consent and often without their knowledge. It is the public that is being asked to assume the risks that the insect controllers calculate. The public must decide whether it wishes to continue on the present road, and it can only do so when in full possession of the facts.

Rachel's campaign helped in banning pesticides like DDT, but today organophosphate and carbamate chemicals which replaced DDT in the pesticide arsenal, although less persistent have greater immediate toxicity for people and wildlife. Poisoning of agricultural workers, gardeners, children, pets, birds, and fish have been associated with these agents. Pesticides may have phytotoxic side effects. They may cause damage to nearby crops, animals, or natural habitats if applied wrongly or carelessly. Pesticides may also harm the environment; some have shown persistence in rivers and watercourses; and, some indeed in the food chain. Furthermore, consideration must be made on the possibilities that even non-persistent chemicals may have adverse long-term effects if overused. Some of the potential hazards have long been recognized,

such as herbicide residues that (a) affect subsequent crops; (b) the danger to bees, and hence to crop pollination; and (c) spraying insecticides on flowering crops; other problems are only now becoming significant: Thus aldrin and dieldrin have been extremely effective in combating soil-born diseases, but for many years their persistence in the soil, and the adverse effects, which they can cause when they enter the food chain, were not realized. The unforeseen impact of nitrogen leaching into rivers, and water courses is now well recognized as causing environmental problems, and consumers lack information on pesticide toxicity and are misled by industry assurances that the chemicals are harmless if used according to label instructions (Jones 1993).

Since many pesticides are still going through registration and most are sufficiently dangerous to require disposal as hazardous waste, the industry's information appears to be quite incomplete. At least twelve wildlife species (two mammals, nine birds and one reptile) in the Great Lakes basin have experienced reproductive and/or population decreases since the 1960s that have been associated with chemical contaminants (Fox 1993).

Protection of humans and wildlife species from the subtle, chronic effect of pollution will require much more stringent regulations than those currently recommended protecting human populations from cancer (Ludwig 1993).

Statement of the Problem

The dependence on pesticides to control weeds, diseases and pests is a common practice in both developing and developed nations. However, the developed and developing nations tend to differ in terms of their policies, guidelines and practices in use of the pesticides. The technological advancement in developed nations enabled them to

minimize the effects of pesticides on environment and health by adopting stringent policies. These nations, through legislation, have set up guidelines: first, to use pesticides to protect farmers when exposed directly to them; and second, to harvest the crops to protect consumers, who consume these food products. National monitoring facilities and a format for advising farmers on the best available practices continue to play a vital role in educating farmers and ensuring the proper use of pesticides.

In developing nations, on the contrary, minimum efforts are made to educate farmers in terms of the use of pesticides and risks involved for their improper use. Little information is available to farmers about these pesticides on the process of selecting, purchasing and methods of using pesticides. Finally, inadequate monitoring is a commonly observed impediment. This situation has resulted in farmers purchasing and using foreign pesticides, without realizing inherent dangers to booster food production. As an extreme example, the discovery of Dichloro-diphenyl-tetrachloroethane (DDT) in 1939, and the subsequent development of insecticides in the 1940s, led to the wide scale use in agriculture and public health (Madhum 1990). Following this was the discovery of highly effective growth regulating herbicides, such as 2,4-D, and MCP. The benefits of these insecticides and herbicides were overwhelming leading to indiscriminate use and almost total dependence on pesticides in the agricultural industry. It was not until the late 50s and early 60s that Rachel Carson brought to the public the dangers and effect of pesticides on humans and the environment. Nevertheless, these pesticides are still being used in many developing nations, even today. Should this practice continue, it defeats the very purpose of pesticides by creating problems to humans, animals, crops as well as the environment. Improper handling, misuse or spilling of pesticides can culminate in

death, such as the Bhopal incident where hundreds of lives were lost (Montague 1987).

Purpose of the Study

The purpose of this research was to conduct a comparative analysis of pesticide policies and guidelines between developed and developing nations, with special reference to Nigeria. The relevance of pesticides to the production of crops and eradication of pests that destroy agricultural products makes this study very important in the policies set up by Nigeria in particular and other developing nations in general.

Significance of the Study

This study was significant because of the impact pesticides have on the environment on human health and animals. Rules and regulations governing the production, distribution, and application of pesticide are designed to safeguard the environment, and human lives. Improper use can be detrimental to the environment and human lives. Therefore, the result of this study will provide relevant information to the policy makers, which in turn will enhance the safety of farmers who use pesticides. It is also significant to know how the rules and regulations are enforced.

Research Objectives

The objective of this study was to compare legislated policies on trade practices, monitoring and other initiatives taken by the Nigerian government as compared to two selected developing nations (India and Zimbabwe) and three selected developed nations (United States, Canada and Europe).

Definitions of Terms

The following definition by the FAO Code of Conduct are used to describe and define some variables in this study:

Agricultural Pollution: The liquid and solid wastes from farming, including: runoff and leaching of pesticides and fertilizers, erosion and dust from plowing, animal manure and carcasses, crop residues and debris

Chlorinated Hydrocarbons: These include a class of persistent, broad-spectrum insecticides that linger in the environment and accumulates in the food chain. Among them are DDT, aldrin, dieldrin, heptachlor, chlordane, lindane, endrin, hexachloride, and toxaphene.

DDT: The first hydrocarbon insecticide (a chemical name: Dichloro-diphenyl-Trichloroethane). It has a half-life of 15 years and can collect in fatty tissues of certain animals. The Environmental Protection Agency (EPA) banned registration and interstate sale of DDT for virtually all but emergency use in the United States in 1972, because of its persistence in the environment and accumulation in the food chain.

Environment: The surroundings, including water, air, soil and their interrelationship as well as all relationships between them and any living organisms. Also referred to as the sum of all external conditions affecting the life, development, and survival of an organism.

Extension: The process in the country concerned with the responsibility of the transfer of information and advice to farmers regarding the improvement of agricultural practices, including production, handling, storage and marketing.

Fogging: The process of applying a pesticide by rapidly heating the liquid chemical so

that it forms very fine droplets that resemble smoke or fog. It may be used to destroy mosquitoes, black flies and similar pests.

Fungicides: Pesticides used to kill fungi (including blights, mildews, molds, and rusts).

Fumigants: These are pesticides that produce gas or vapor intended to destroy pests in buildings or soil.

Heptachlor: An insecticide use for seed treatment.

Herbicides: Pesticides designed to control or destroy plants, weeds, or grasses.

Insecticides: Pesticide compound specifically made to kill or control the growth of insects.

Integrated Pest Management: A pest management system that, in the context of the associated environment and the population dynamics of the pest species; utilizes all suitable techniques and methods in as compatible a manner as possible and maintains the pest populations at levels below those causing economically unacceptable damage or loss.

Maximum Residue Limit (MRL): The maximum concentration of a residue that is legally permitted or recognized as acceptable in or on a food, agricultural commodity or animal foodstuff.

Packaging: This is a container together with the protective wrapping used to carry pesticide products via wholesale or retail distribution to users.

Prior Informed Consent (PIC): Refers to the principle that international shipment of a pesticide that is banned or severely restricted in order to protect human health or the environment should not proceed without the agreement, where such agreement exists, or contrary to the decision of the designated national authority in the participating importing

country.

Protective Clothing: Clothes, materials or any devices that are designed to provide protection from pesticides when they are handled or applied.

Registration: The process whereby the responsible national government authority approves the sale and use of a pesticide following the evaluation of comprehensive scientific data demonstrating that the product is effective for the purposes intended and not unduly hazardous to human or animal health or the environment.

Repackaging: The transfer of pesticide from any commercial package into any other, usually smaller, container for subsequent sale.

Residue: Any specified substances in food, agricultural commodities, or animal feed resulting from the use of a pesticide. The term includes any derivatives of a pesticide, such as conversion products, metabolites, reaction products, and impurities considered being of toxicological significance. The term "pesticide residue" includes residues from unknown or unavoidable sources (e.g., environmental) as well as known uses of the chemical.

Severely Restricted: A pesticide for which virtually all registered uses has been prohibited by final government regulatory actions but certain specific registered use or uses remain authorized.

Toxicity: A physiological or biological property, that determines the capacity of a chemical to do harm or produce injury to a living organism by other than mechanical means.

Use patterns: The combination of all factors involved in the use of a pesticide, including the concentration of an active ingredient in the preparation being applied, rate of

application, times of treatment, number of treatments, use of adjuvant and methods and sites of application which determine the quantity applied, timing of treatment and interval before harvest, etc.

Limitations of the Study

This study relies on secondary sources of data. Therefore, uniform information may not be available among all nations covered in the study. The study utilizes, to the extent available, publication materials from Food and Agricultural Organization, of the United Nations, the World Health Organization, Regional Organizations and national environmental protection agencies. Thus, any limitations these reports/publications may have been neither detected nor rectified.

Understandably, vast differences existed in the availability of information between developed and developing nations. That is, there is a preponderance of information available on pesticide policies in developed nations, while such information is discrete, scanty and fragmented for developing nations. In Nigeria, for example, pesticides are lumped into a single category under the title of "chemicals" along with non-pesticide chemicals. Such broad classification posed difficulties for appropriate and accurate analysis of pesticide use and trade practices in developing nations.

CHAPTER II

PESTICIDE USE AND ITS EFFECT ON HUMAN HEALTH AND THE ENVIRONMENT

The Silent Spring Debate in the1960s

A seminal study by Rachel Carson generated an unprecedented debate about the effects of pesticides on human health and the environment. Specifically, her thesis was that pesticides are used excessively with little or no regard for their impact on either human health or nature. As a result, she contested, they were an environmental degradation and widespread threat of cancer and other chemically induced diseases. She concluded that human action had become the dominant environmental influence, if not an outright hazard (Graham Jr. 1970). The Washington Post commented, "Carson's negative case is virtually as powerful as the poisons she deplores" (July, 13, 1962: 17).

Public Criticism of "Silent Spring" eventually formed into two broad categories. Chemical industry and agribusiness executors viewed the problem in education terms. The public needed to be reminded about the benefits of pesticides to society so that such attacks could be weighed properly. They favored flooding the public consciousness with "experts" who refuted Carson's claims regarding hazards of pesticides. Manufacturers expanded advertising campaigns to emphasize that a gloomy future loomed should all pesticides be banned. But Carson had charged many scientists with creating professional

objectivity for obeisance to the needs of industry and of the old research funding. These criticisms struck at the heart most of the pesticides research, performed both in industries and major universities. In August 1962 the President's Science Advisory Committee was formed to study the issue.

Several studies conducted subsequently between 1963 and 1969, were referred to as "post Silent Spring era" research. This period witness a fascinating proliferation offering "expert" studies, each claiming to be the definitive analysis on pesticides and debunking claims propagated by rival studies. While one group's studies maintained that federal pesticides policy inadequately deals with mounting human health and environmental dangers and therefore requires major revisions, the other set studies contended the public fears about pesticides are misplaced because the alleged hazards are minuscule compared to the benefits, and no revision is necessary. Being so split, science became less powerful and reputation of science and scientists suffered. Subsequently, a series of government committees, sub committees, political analytical data, including DDT battle, took place in the 1960s. However, the direction of central policy was still with the United States Department of Agriculture (USDA) and the congressional committee promoting agriculture (Bosso 1990).

TABLE 2.1 FEDERAL INSECTICIDES, FUNGICIDE AND RODENTICIDE ACT (FIFRA) IN 1947 AND 1972

	1947	1972
Problem	To ensure product quality	To prevent harmful effects
Initiation	Industry, agriculture and USDA	EPA, Environmentalists
Participation in Policymaking	Narrow: -Industry groups -Farm groups -Agriculture committee members in both houses	Broad: -EPA -USDA Environmentalists -Industry groups -Farm groups -House and senate actors -State governments -News media
Facts	Minimum visibility, little controversy; bill written by USDA, with industry help; Little house committee action; No senate hearings or debate; passed with little publicity	High visibility, much controversy; conference Between committees Between chambers; Intense floor debate, amendment and substitutions offered A conference committee needed.
Key Decision Arena	House Agriculture committee	House and senate agriculture Committees:

Source: Bosso, Christopher J. Pesticides and Politics, The life cycle of a public issue, Pittsburgh, 1990, p 10

Other Studies on The Effect of Pesticides

Raven et al. (1983) focused on the effects of improper and excessive use of pesticides on human health and environment. Their study revealed that pesticides are toxic chemicals employed to control the size of the unwanted pest populations such as insects, rodents, fungi or weeds. However, these benefits do not come without price, sometimes more than what we are willing to pay. Pesticides affect numerous species other than their intended target and create imbalances in the ecosystem. Also many pesticides can resist degradation and move great distances, thus, causing even a greater problem to humans, wildlife, and the environment.

Grissom (1992) affirms Raven's assertion that pesticides often kill species other than the ones they were intended to. Pesticides may wipe out beneficial species such as honeybees and ladybugs. Biological magnification of persistent chemicals is another problem. Many synthetic pesticides cannot easily be degraded by natural decomposers and thus accumulated in the environment and entered the food chain. Furthermore, the prolonged use of pesticides can result in the development of genetic resistance in the pest species. Rapid evolution through short generation spans and large populations allow many pests to adapt quickly to the pesticides. Such a mechanism calls for a constant increase in quantities of pesticides to have the same level of control on pests, over time. Acute and chronic health problems are likely to emerge due to high levels of toxins, which can harm organs, cause cancer and, at times, even death. The exposure to toxins is mainly during the times of handling the pesticides during application, transportation or storage.

Pesticides vary in toxicity and persistence; at the same time individuals vary

widely in their susceptibility. A chemically sensitive individual can be severely affected by even a slight exposure. Pesticides enter the body through inhalation, ingestion, or by contact with the skin. They can be inhaled not only during application but also much later when residues from slowly degrading pesticides such as Lindane, DDVP, and Chlordane re-enter when mixed with dust (Loevinsohn 1987).

Saleh et al. (1995) conducted a study in the West Bank on pesticide usage, which revealed widespread problems in both usage and disposal of pesticides. Fourteen of the pesticides used in the West Bank were suspended, canceled or banned in other parts of the world. Most of the labels on the pesticide containers were written in Hebrew, a language that most of the farmers could not read. Availability of extension services was found to be inadequate, as was the knowledge and understanding of the dangers of pesticide use among farmers. Nevertheless, a relatively high number of farmers at the West Bank expressed willingness to learn more about pesticide use and the problems associated with it.

The study in the West Bank is a common phenomenon in most developing nations. A comparative study of pesticide use and exposure patterns in Brazil, Costa Rica, Ecuador, Paraguay, Venezuela, Egypt, South Africa, India, and Malaysia concluded that health and safety issues are exacerbated by: (1) general lack of hazard awareness, the lack of protective clothing or difficulty of wearing protective clothing in tropical climates; (2) shortage of washing facilities for cleaning after use, or in case of accidental contact with pesticides; (3) the recycling of pesticide containers for storing food and water; (4) illiteracy; (5) labeling difficulties pertaining to language, complexity or misleading information; (6) lack of regulatory authorities and lack of enforcement

(Dinham 1993).

The problem of labeling difficulties was also found in other studies. Tayaputch (1988), in a survey conducted by the Thai Division of Toxic Substances, found that forty four percent of randomly selected pesticide formulations had the active ingredients, incorrectly labeled. Wanthi (1993) found that three-fifths of Kenyan farmers, many of whom were illiterate, could not understand the instructions written on pesticide containers (Adam 1976). Mexican farm workers in the state Chiapas poisoned by Paraquat did not know the proper dilution for Paraquat use. They learned to use Paraquat from friends, rather than from qualified authorities. Thus, when farmers cannot read directions on the containers it causes chaos to them as well as to the larger society.

Grissom (1992) studied the problem of human exposure to pesticide and observed that, the main source of contact is through the skin, stemming from use of improper equipment to mix or spray pesticides. For example, kitchen spoons, tin cans and bottles are often used to mix active ingredients. Organophosphates and carbonates are particularly capable of absorption through the skin, even if clothing is worn.

A study of Malaysian plantation workers identified several exposure routes. Leaking and outdated hand sprayers average 27.84 milliliters of dermal exposure per hour of application and spraying machine operator's average 31.78 milliliters. Most farmers did not wear gloves when spraying (Tan 1988). Studies carried out in cotton growing regions of Uzbekistan documented serious health problems stemming from indiscriminate pesticide application. Heavy spraying of numerous compounds including organochlorine and highly toxic organophosphorous insecticides, expose workers and populations living amid the fields to high chronic doses in water, air, and food. These

exposed populations suffered higher rates of respiratory, gastrointestinal and acute inflammatory kidney infections (Bakhnitdinov 1991).

A study of pesticide exposure among farmers in Central Java observed that in 21 percent of the spray operations the sample of farmers averaged three or more neurological, intestinal, or respiratory symptoms of poisoning. Nine percent of farmers in the sample reported pesticide-poisoning incidents over a period of one year (Kishi 1995).

In many developing nations (where families share farm work), pesticides and food are stored within close proximity in the house. A study in Central Java revealed that more than four-fifths of farmers stored pesticides in their homes within easy reach of children. Three-fourths stored these chemicals within the living quarters including the kitchen where food is cooked and stored. Fewer than one in four pesticide containers were kept sealed and half were leaking (Kishi 1995). Similar problems were found in St. Lucia and Sri Lanka (McDougall 1993). A study of Kenyan farmers revealed that 62 percent of the farmers stored pesticides in areas designated for sleeping or cooking. One-half of the study sample used cooking pots or water containers to mix pesticides (Mwanti 1993).

Moses (1993) discovered that 85 to 90 percent of pesticides applied in farms never reach targeted organisms. They merely disperse through the air, soil, and water. While many organic pesticides degrade in a short time into the environment, most organochlorine and metal-containing pesticides do not. The half-life of toxaphene in soil, for example, takes up to 29 years to degrade (PAN 1993). From soils, persistent pesticide residues can be carried over plants and herbivores. In the Argentine cities of Santa Fe and Rosario, most butter samples contained pesticide residues (Lenardon 1994).

Pesticides that are not degraded in soils can also drain into rivers and lakes and move into the aquatic food chain creating health hazards to animals. Such chlorinated pesticides have been detected in rivers in Tanzania, Columbia, Indonesia, Malaysia, China, and Thailand at levels suggested to be severe (Egboka 1989). A study by Abdell-Gawaad (1990) revealed that residues of DDT, endrin, lindane, were found in 25-88 percent of the food samples from the cities of Alexandria, Behera, Gharabia and Dakahlia. Henao (1993) in Brazil found that 13.6 percent of fruits and 3.7 percent of vegetables exceeded tolerance limits, which causes a severe health risk to consumers. Rola (1989) found in the Philippines in 1985, vegetables in town and city markets had DDT, aldrin, dieldrin, chlordane, heptachlor and other organochlorines, despite the fact that any use of these compounds was banned, as in the case of most developed nations.

Some studies tried to establish a relationship between pesticide exposure and death among human beings. A study of mortality trends and pesticide use in Central Luzon in the Philippines found a clear association between pesticide exposure and mortality rates. The study concluded that mortality rates increase among adult male farmers exposed to pesticides in smallholder rice farming. Seasonal peaks in mortality among farmers coincided with periods of intensive pesticide application (Loevinsohn 1987).

People exposed to pesticides are at increased risk of contracting certain cancers known to be associated with immune suppression. Lymphoma, leukemia, and stomach cancer is more common among persons exposed to pesticides. Soft-tissue sarcomas, melanomas, and squamous carcinomas of the skin and lip occur disproportionately in renal transplant recipients. Brain and skin cancers occur frequently among bone marrow

transplant recipients (Blair 1992).

Other studies show elevated risks of the same cancers among those working outside agricultural areas that involve pesticide use; Such as maintenance, industrial, forest product, golf-course workers, and veterinarians (Kross 1994, Hoover 1991).

Pesticide effect on the immune system is another area that researchers have concentrated on. Most of the foci in this area are the measure of immunotoxic potential, such as antibody ratios, complement level, and white blood cell count. Deviations in one or more of these immune components have been observed among a number of pesticide-exposed groups, including formulators in India, greenhouse workers in Argentina, factory workers in Poland and China, sprayers and greenhouse workers in Hungary, and rural dwellers in Cuba (Desi 1992, Diezcordova 1991, Jingbo 1991).

Food and Agricultural Organization (FAO) Report

The FAO (1996/20) report disclosed those farm workers suffer from pesticide exposure the most, with an estimated 20,000 deaths each year. Ninety-nine percent of these deaths occur in developing nations due to farming practices, storage of pesticides in living areas, location of residential areas near application sites, method of application and type of equipment used. Common environmental problems associated with pesticides include contamination of water resources and insect resistance and resurgence. Some pesticides deplete the ozone and exacerbate the greenhouse effect. Further, diffuse aerial spraying of pesticides in the fields damages non-target crops and may destroy non-target species. Pesticides that enter the waterways through run-off may result into killing fish and other aquatic animals. Wild animals and domestic livestock also ingest pesticides by

drinking contaminated water or by eating smaller animals and vegetation in which toxic chemicals exist.

The introduction of DDT to reduce malaria in India resulted in the number of cases dropping from 7.5 million to 50,000; however, increased resistance eventually raised the number back to 6.5 million. Although only 182 species existed in 1965, there are now more than 900 pesticides and herbicide resistant species of insects, weeds, and plant pathogens, while seventeen insects show resistance to all major categories of insecticides.

The effect of pesticides on the environment is not only affected by the use, but also by accumulated unused pesticides that have not been disposed off. Large quantities of unused pesticides pose a serious threat to the environment and public health in developing nations. There are more than 100,000 tons of unused pesticides in the developing nations, of which 20,000 are in the continent of Africa. Obsolete pesticide stocks are potential time bombs. Long - time storage leads to leakage, and seepage and various accidents related to pesticides. Storage conditions rarely meets internationally accepted standards. Most pesticides deteriorate and leak their contents into the soil, contaminating groundwater and the environment. Most of the storage facilities are located in the centers of urban areas or close to public dwellings. An example of this is the case studied in Zimbabwe where nearly 1,000 empty containers lined up for safe disposal but were never disposed off.

The FAO (1997/21) blames donor organizations, aid agencies, agrochemical companies and recipient governments for the steady accumulation of obsolete pesticides in developing nations. Non governmental agencies occasionally donate pesticides to

developing nations that cannot afford purchasing it for their farmers. These pesticides are donated with good intention, but most of the time the pesticides donated is almost obsolete and expired prior to their application. Sometimes the chemicals may not be obsolete but are banned in the country, where the donation originates. Recipient governments, on the other hand, are always eager to receive donations without checking for the risk involved, due to the high demand of such chemicals by farmers. Eventually, when such chemicals are made available to farmers, the proper procedures are not followed due to lack of education and training.

The technology used to spray pesticides in most developing nations, reflect standards used 40 years ago, resulting in pesticides waste, which also affects human Health. The FAO further reiterated that farmers and equipment operators have insufficient knowledge about pesticides and correct methods of application. Extension services rarely have technicians with any specialized knowledge of application technology. In many nations the only specialists offering advice to farmers on application technology, handling and calibration of their equipment are representatives of pesticide companies. Most farmers still believe in high volumes, high pressure, and high doses, as the most appropriate way to apply pesticides.

In India, high levels of pesticide residues in food crops, compared to the world average, are reported. The FAO indicated that this is an indication that pesticides were used in a wrong way. Although India has national standards for spray equipment, which are followed by the major manufacturers, there are still the small manufacturers serving local needs that do not comply with quality standards. A similar situation is reported in Thailand.

In Indonesia, 58 percent of manual spray equipment was found to be leaky and, in Malaysia, lack of training, improper maintenance of spraying equipment and insufficient protective clothing have contributed to pesticide poisoning among spray operators. A pesticide residue in water was primarily due to excess pesticide used by farmers. In Vietnam, supply of safe spray equipment was limited mainly due to the absence of national legislation and standards and lacks of training of operators. In the Philippines, sprayer leakage is very common. The majority of farmers and equipment operators never received any formal training prior to their first contact with pesticides and application equipment.

In Columbia, flowers are sprayed weekly with up to 6,000 liters of pesticide per hectare. And in Brazil, the application volumes of 10,000 liters of pesticide per hectare in orchard crops have been reported. Application of such heavy dosages of pesticide often leads to soil and groundwater contamination, which in turn affects human health and the entire ecosystem.

CHAPTER III

INTERNATIONAL GUIDELINES ON PESTICIDE POLICIES FOR TRADE, REGULATION AND USE

The United Nations Food and Agricultural Organization (FAO) advanced some important initiatives to regulate the international pesticide trade practices. In 1985, the FAO established the International Code of Conduct (Code) on the Distribution and Use of Pesticides, giving participating nations a formal method to refuse or consent to hazardous imports. FAO designated this method as the Prior Informed Consent (PIC) procedure (UNEP/GC 1989).

After the Code and PIC further efforts have been made to regulate the use of pesticides and trade. Among those were the United Nations London Guidelines for the Exchange of Information on Chemicals in International Trade (London Guidelines) and United Nations Codex Alimentarius Commission (Codex). The London Guidelines attempted to incorporate PIC procedures while Codex attempts to harmonize standards for maximum residue levels (MRLs) for participating nations. All these efforts on guidelines on pesticide trade and application by the FAO are voluntary. There is no penalty, criminal or financial, to violators (UNEP/GC 1989). The WHO recommended classification of pesticides by hazard and provided guidelines to such classification (WHO 1986).

The guidelines set up by the FAO and WHO are to aid developing nations that do

not have adequate policies guiding the proper trade and use of pesticides. Where appropriate regulations do exist, those nations often lack the resources necessary for implementation and enforcement (UNEP 1994).

Prior Informed Consent and the London Guidelines

Prior Informed Consent (PIC) is the regulatory process used by nations as a guideline to control products for export by providing notification and adequate data to the importing country. PIC presently exists as the most effective way to regulate the international trade of pesticides and prevent damaging exposure because it encourages importing nations to make well-informed decisions through an affirmative deliberation. After reviewing the notification, importing nations must give consent before exporters are permitted to ship pesticide products. PIC preserves the sovereignty and self-determination of an importing state, and enhances the ability of a country to protect its citizens and environment (Mehri 1988).

PIC, which is a voluntary, regulatory agency, does nothing to help developing nations build an enforcement and regulatory foundation that will assist in evaluating a pesticide for import. Even if developing nations had the regulatory structure to make informed decisions on what pesticides to import, there is no mechanism to force manufacturers to comply.

The United Nations Environmental Program Governing Council (EPGC) also complimented PIC. EPGC popularly termed as the "London Guidelines" on June 17, 1987, was amended in 1989 to introduce voluntary measures for information exchange on

pesticides. It provides a structure for exporting nations to formally obtain the consent of importing nations on shipments of "banned" and "severely restricted" pesticides. Participating nations also have the opportunity to explain their policies regarding the future receipt of banned or restricted products. Decisions to ban or severely restrict a chemical are circulated to all participating nations. Notice provided to importing nations also appears in the International Register of Potentially Toxic Chemicals (IRPTC), which maintains a file of circulated notices. Under the IRPTC, each participating nation is assigned a Designated National Authority (DNA) to exchange information regarding pesticide imports and exports. The IRPTC prepares Decision/Guidance documents for pesticides covered by PIC and then forwards them to each participating nation through the DNA. Once a country decides whether to import a pesticide, the DNA notifies the IRPTC. In turn, the IRPTC forwards the decision to all participating governments. The IRPTC has a database of all these decisions for reference by exporters and importers. The main benefit received by importing nations participating in this program is that the IRPTC forwards notifications to them directly rather than having to rely on exporting nations to provide them.

The London Guidelines are focused on the promotion of information exchange for the protection of human health and the environment. Although the London Guidelines were not designed to address the complex problems encountered by developing nations, they nonetheless succeeded in identifying and resolving some of the areas of concern. The two-step system provides developing nations an opportunity to receive export

notifications for banned and severely restricted substances. The first step requires the circulation of notices where regulatory actions have been taken under domestic law. Circulation is only required for those regulatory actions constituting bans or severe restrictions. The second step identifies those chemicals that have been banned or restricted by ten or more participating nations.

In an effort to prevent shipment of unwanted chemicals to importing nations, the London Guidelines include a PIC procedure requiring formal correspondence between importing and exporting nations. Exporting nations must obtain an affirmative response from importing nations before shipment. The notices must include the reasons for the importing country's regulatory action and a contact point for further information. The London Guidelines PIC procedure requires exporting nations to inform other nations, either directly or through the IRPTC, that a chemical has been domestically "banned" or "severely restricted." The notification includes the chemical identification, a summary of the control action taken, alternative compounds to the chemical, and the contact where importing nations can request additional information. All interested participating nations receive the list. The London Guidelines also require exporting governments to declare the regulatory status of a pesticide at the earliest stage of export.

The London Guidelines encourage exporting nations to use classification, labeling, and packaging requirements that are as stringent as those in their own domestic market. In addition, they call for the exchange of technical advice and precautionary information on chemicals introduced into the market. Finally, developed nations are

encouraged to recognize the unique circumstances of developing nations by providing them financial and technical assistance.

Another significant feature of the London Guidelines is its provisions covering notification and labeling requirements for hazardous chemicals. These provisions are especially important because they are the first steps to insuring that instructions and warnings about pesticides are communicated in the language of the importing country. The London Guidelines state that as far as practicable, precautionary information should be provided in the principal language or languages of the State of import and of the area of intended use, and should be accompanied by suitable pictorial and/or tactile aids and labels. This provision continues by requiring harmonized procedures for the classification, packaging and labeling of chemicals, taking into account the special circumstances surrounding the management of chemicals in developing nations. Even with these guidelines in place banned and restricted pesticides still find its way to developing nations. Although the London Guidelines attempt to increase pesticide safety through the exchange of information, they do not adequately ensure compliance with PIC requirements because they are voluntary (FAO 1989).

International Code of Conduct on Distribution and Use of Pesticides

The United Nations Food and Agriculture Organization (FAO) adopted the International Code of Conduct on Distribution and Use of Pesticides (CODE) in 1985 to reduce the health and environmental hazards caused by pesticides, and to establish firm

guidance for their export and sale. By adopting the Code, FAO's aim was to combine different domestic policies for pesticide regulation that are acceptable to the international community on trade and use. As in the case of London Guidelines, the Code is voluntary to all participants of the Code. The FAO adopted Prior Informed Consent (PIC) as an integral part of the Code in 1989, for its merit of detailed procedures on informing the importing country before pesticides are exported (FAO 1989). Generally, one of the three following criteria constitutes the PIC process: (1) The chemical has been banned for health or environmental reasons in five or more nations; (2) The chemical has been banned or severely restricted for health or environmental reasons in a single country after January 1, 1992; or (3) The chemical causes health or environmental problems under the conditions of use in developing nations.

The importing country will then decide if the criteria set up by PIC outweigh its need for the pesticides before accepting to receive the pesticide. Otherwise, the pesticide entry would be denied.

In drafting the substantive provisions of the Code, the FAO intended to balance the divergent needs of developing and developed nations. For example, developed nations have concerns over the existence of residues in food or commodities imported from developing nations because of unregulated use of pesticides. The Code provides that manufactures make a good faith effort to adhere to all recognized practices. In addition, the Code encourages developed nations to recognize the needs of developing nations when promulgating residue control programs for imported food. Through this, it is hoped

that it would keep dangerous pesticides out of the market, since most developing nations do not have adequate enforcement laws to combat the trade of pesticides.

Participating nations are encouraged to form collaborative efforts on the method of enforcement, and report to the FAO on their methods of compliance and progress. Although the Code recognizes that governments possess the ultimate responsibility to regulate the distribution and use of pesticides within their nations, the Code encourages governments to meet their responsibility through the implementation of a pesticide registration and control program. Under this program, governments must register pesticides before they can be used domestically, and all registration programs must include provisions for enforcement. To gain international respect for each country's registration program, the Code encourages governments to establish registration schemes and infrastructures to ensure that each pesticide product is registered under the laws or regulations of the country.

The Code establishes standards for both governments and industries in several reporting categories including pesticide development, packaging, labeling, advertising, disposal, and storage. Within these categories, the Code notes that concerted efforts between governments and the pesticide industry are acceptable means to develop and promote integrated pest management (IPM) systems and the use of safe and efficient application methods. The Code emphasizes that the pesticide industry must adhere to its provisions in the manufacturing, distribution, and advertising of pesticides.

Manufacturers, according to the Code, must test each pesticide by recognized

methods to fully evaluate safety, efficacy, and long-term effects, with an emphasis on the expected conditions in the regions of use. In an effort to reduce public health hazards, the Code requires governments to review all pertinent information on the pesticides marketed in their country, determine their acceptable uses and identify the intended consumers within the public sector. Although adherence to the Code is voluntary, the labeling and packaging provisions attempt to establish a system to implement PIC procedures.

The Code places controls on advertising to prevent deception and promote safe application. Labeling is expected to be appropriate for each specific market by including "information and instructions in a form and language adequate to ensure safe and effective use." Manufacturers must guarantee that labels truly reflect testing data. The Code charges industry to make "every reasonable effort to reduce hazard [s]" by using "clear and concise labeling." Labels must state "recommendations consistent with those of the recognized research and advisory agencies in the country of sale," and should include "symbols and pictograms whenever possible, in addition to written instructions, warnings and precautions." Labels on all pesticides should reflect appropriate hazard classifications of the contents. Labels must contain a warning against the reuse of containers, as well as instructions for the safe disposal or decontamination of empty containers (Kalmbach 1987).

The PIC prohibits exportation of any pesticide severely restricted or banned to another country participating in the PIC system that has expressed unwillingness to receive that pesticide. If a pesticide - exporting country decides to ban or severely restrict

the use of a pesticide, that country must notify FAO, which in turn will forward the decision to all participating nations through the IRPTC.

Under the Code, if a product is not used or registered in a particular exporting country, it does not preclude it from exporting it to another country. However, the norm that no company should trade pesticides without a proper and thorough evaluation for risks involved, has gained wide acceptance in the international community.

A large number of developing nations are situated in tropical and semi-tropical regions where the conditions and pest problems can differ markedly from those in nations of manufacturing and exporting pesticides. Thus, governments of exporting nations may not adequately be able to assess the suitability, efficacy, or safety of pesticides for the conditions in the country of ultimate use (Bamako Convention 1989).
Each importing country must make judgments in conjunction with industry, and consider the available scientific data and the conditions prevailing, for its use. Although the Code does not solve all of the problems in the international pesticide trade, it does define and clarify the responsibilities of the various parties involved in the development, distribution and use of pesticides.

Codex Alimentarius Commission (Codex)

In the early 1960s, Codex Alimentarius Commission (Codex) was jointly established by FAO and World Health Organization (WHO) to set up internationally acceptable food standards. On the basis of the research conducted by the FAO/WHO,

Codex compiles a list of pesticides that should be authorized for use in light of food safety risks. At the same time, Codex establishes over 2,000 maximum residues limits (MRLs), taking into account findings on toxicity from their Expert Committee and good agricultural practices. The MRLs are particularly relevant to nations that export staple crop foods, including the U.S. A food manufacturer must avoid using raw materials that may lead to undesired levels of pesticides in the finished food product. Codex MRLs are tolerances based on standards that the Committee determines to be good agricultural practice in different nations with different climatic conditions and pest problems. Codex MRLs are also valuable tools representing a consensus of international opinion regarding safety and practicability of pesticides in food staples (WHO 1988).

Codex establishes MRLs by following an eight-step process, which may take several years to complete:

(1) The FAO commission determines the need for a standard and assigns the work to a committee, known as the WHO Expert Group on Pesticide Residues, which usually recommends that Codex establish an MRL or elaborate a standard;

(2) A draft standard is then prepared;

(3) The Commission submits the proposed draft standard to interested international organizations for comment on all aspects including possible implications of the draft standard on their economic interests;

(4) The Codex Committee on Pesticide Residue (CCPR) will also evaluate the proposed draft standard by considering "all appropriate matters" including the

need for urgency, comments submitted by individual governments, and the likelihood of new information becoming available in the near future;

(5) CCPR then sends the draft standard to the Commission through the Secretariat for adoption as a draft standard;

(6) International organizations and governments receive the draft standard for comment;

(7) The Secretariat, along with private organizations, forwards any comments to the committee;

(8) The Commission reviews and considers comments and finally executes the draft standard for adoption and publication as a Codex Standard.

Codex was set up to establish a collection of internationally adopted food standards, presentable in a uniform manner. These food standards aim at protecting consumer's health and ensuring fair practices in the food trade. Codex was also established harmonized international MRLs that prevent food product trade barriers.

CHAPTER IV

PESTICIDE POLICIES IN DEVELOPING NATIONS

In developing nations, pesticide use is still growing rapidly, and chemicals that have long been banned or restricted on health grounds in the western nations may still be in use. Moreover, pesticide regulations are weak and farmers lack the training and equipment to handle pesticides safely. People in these nations are at high risk from chemical exposure that weakens their immune defenses (Jumah 1994).

These weak policies and lack of training to handle equipment often leads to the problems associated with pesticides in the environment affecting human health. Environmental movements in turn created awareness in the public concerning the hazardous effect of pesticides. This led to setting up guidelines and regulations by national governments and international organizations with cooperation among nations. These were to ensure safety on application, storage and disposal. It was also to prevent the trafficking of already banned chemicals (FAO 1992).

Manufacturers of pesticides took advantage of these weak regulations to export pesticide to developing nations. This is evident since the 1960s, when some of the harmful pesticides were banned or strictly regulated in industrialized nations, because of their impact on public health and the environment. At the same time, these nations allow pesticide manufacturers to legally export these very chemicals to developing nations, nations often without sufficient regulatory structures or technical resources to prevent

pesticides misusing. Mowbray (1988), in a study of the South Pacific Regional Environmental Program (SPREP) revealed that more than 40 pesticides that have been banned or severely restricted in the U.S., such as DDT, heptachlor, and aldrin are still in use in this region. And more than half of the pesticides imported into the pacific region come from manufacturers and formulators in Australia and New Zealand. Among the largest of these exporters are ICI, Rhone Poulenc, Dupont, Bayer, BASF, Ciba-Geigy and Hoechst.

These companies and others, according to Mowbray, both import and distribute their products directly to South Pacific Island nations and other developing nations of the world, or they work through large wholesalers and retailers and even some governments. Companies from the Europe and the U.S. are also directly or indirectly involved in the exportation of pesticides to developing nations.

In addition to marketing pesticides that are banned or severely restricted in industrialized nations, multinational chemical companies, as well as smaller producers, sometimes manufacture and market chemicals for export that have never been registered in the country of origin, or any other country. These pesticides are not subject to even the most limited testing requirements, and therefore their health and environmental toxicity are not known (FAO 1996/20).

Locating factories in developing nations is common practice: In its report the South Pacific Commission Plant Protection Service news indicated that many international chemical companies have located their factories in developing nations where costs are lower and environmental and safety regulations are fewer, or not enforced. There is also the lack of expertise to evaluate data for registration of pesticides,

and many nations in developing nations rely on information from Australia, New Zealand and USA. However, this data is drawn from areas of very different environmental conditions, and may not be applicable to the Pacific and tropical conditions of extremes of heat and rainfall, cyclones, low biological diversity, limited groundwater supplies, and porous soils (South Pacific Commission Plant Protection service 1988).

Due to lack of concern and training on the use of pesticides, farmers often apply chemicals without due regards to its effect to their health or the environment. The technology used to spray pesticides in most developing nations reflect standards used 40 years ago, resulting in pesticides waste and environmental damage. The FAO further reiterated that farmers and equipment operators have insufficient knowledge about pesticides and correct methods of application. Extension services rarely have technicians with any specialized knowledge of application technology. In many nations the only specialists offering advice to farmers on application technology, handling and calibration of their equipment are representatives of pesticide companies. Most farmers still believe in high volumes, high pressure and high doses, as the most appropriate way to apply pesticides (FAO 1998).

It is not only the knowledge of application but also the equipment used for the application. The equipment is often outdated, sometimes not good working condition, and lacking spare parts for repairs. According to Theodore Friedrich of the FAO (1989), in many nations, most of the spraying equipment is in extremely poor condition. Equipment like nozzles are normally not replaced and are even enlarged on purpose to achieve higher flow rates. Studies in Pakistan, Thailand, Vietnam and Columbia indicate

problems arising from the use of spray equipment and in India, higher level of pesticide's residue is present in food crops compared to world average (Farah 1994).

Due to these problems, the FAO and other world organizations came up with basic guidelines for producers and users of pesticides for a basic method of how to and when to use pesticides. According FAO, "Prior Informed Consent" is a procedure that helps participating nations learn more about the characteristics of potentially hazardous chemicals that may be shipped to them. To initiates a decision - making process on the future import of these chemicals by the nations themselves and facilitates the dissemination of this decision to other nations. PIC process gives importing nations the power to make an informed decision on which chemicals they want to receive and to exclude those they cannot manage safely (PAN 1989).

Pesticides prohibited, often find its way to developing nations. For this reason, the FAO made an amendment to the international code of conduct on the distribution and uses of pesticides on the availability and uses, distribution and trade, labeling, packaging, storage and disposal. The international code of conduct on the distribution and use of pesticides specifies individual nations and responsible authorities are mandated to give special attention to drafting rules and regulations on the availability of pesticides. These guidelines should be compatible with existing levels of training and expertise in handling pesticides on the part of the intended users. In addition, government should take note of and, where appropriate, follow the WHO classification of pesticides by hazard and associate the hazard class with well-recognized hazard symbols as the basis for their own regulatory measures. In the same event, the type of formation and method of application should be taken into account in determining the risk and degree of restriction appropriate

to the product. All pesticides made available to the general public should be packaged and labeled in a manner consistent with the FAO guidelines on packaging and labeling and with appropriate national regulations. Prohibition of the importation, sale and purchase of an extremely toxic product may be desirable if control measures or good marketing practices are insufficient to ensure that the product can be used safely (FAO 1998).

Another area of concern is the donation of pesticides by external donors, who often introduce pesticides to the farmers without providing adequate or appropriate materials for safe use or guidelines and training on the application of pesticides. When the pesticides are not used, they become obsolete. Large stocks cases of obsolete pesticides waiting to be disposed were reported in East Africa. Some large parts of these stocks are unused donations provided for the emergency locust control operations, and due to lack of disposal facilities these pesticides are still awaiting disposal.

In developing nations where there is little or no training on safe and effective use of pesticides, the problem is further compounded by ignorance leading to indiscriminate use and abuse of these chemicals. The most serious effects of pesticides occur through accidental exposure either during manufacture, storage, transportation, distribution and application. Such accidents, which could be minimized by protective clothes that reduce dermal absorption and/or inhalation are accentuated in the developing nations, particularly in the tropical and subtropical nations like Nigeria where ignorance as well as the hot humid weather make wear of protective clothing a rare occurrence.

The problems associated with pesticide use are so prevalent that the estimates of 278,000 cases of pesticide poisoning are occurring annually in developing nations with

about 10,000 deaths. A case in point is the Bhopal incident in India where accidental leakage of methyl isocyanate from a storage tank which resulted in the death and injury of more than 2,000 people. In 1971-72, thousands of people in Iraq developed symptoms of food poisoning and more than 500 died due to eating bread which was prepared from cereal contaminated with methyl mercury fungicide (WHO 1989).

Although there is overwhelming evidence supporting the widespread use of pesticides and their advantages, which is unparalleled to any other method of eradicating pests, i.e., fast and effective; more and more people are becoming aware of the hazardous effect of these pesticides, especially when they are not used and disposed of properly. Consequently, many people in developing nations of the world especially in Nigeria have evolved a well-established system of research, monitoring and residue analysis as a basis for the strategic control of the use these toxic, yet tremendously essential chemicals. This led to the ban of or severe restrictions of organochlorine pesticides such as DDT, Aldrine, Dieldrin, Chlordane and Toxaphene, known to be persistent in the environment.

Pesticide Policies in India

Pesticide policies and regulations in India are placed under the Department of Agriculture following the Insecticide Act that was enacted and passed in 1968. Under this Act, proper procedures must be followed in the trade, use and storage of pesticides. The Department of Extension Services is charged with educating farmers on the proper procedure and uses of these policies.

While the Department of Agriculture works with the farmers in making sure those proper policies are adhered to, the Ministry of Chemicals, Petrochemicals and Pharmaceutical Industries is responsible for the control, manufacture and trade of

pesticides. Under this ministry, all policies on the use of organic and inorganic chemicals must follow international standards on trade, manufacture and distribution. Labels must be clear, stating the chemical content and directions of use and must be in the language of the users (India Government Website 2001).

Efforts are being made by the government to concentrate more on Insecticide Pest Management (IPM). Under the IPM approach, greater reference is given to bio-control of a pest and the use of organic chemicals in combination with inorganic chemicals.

India, although grouped into the class of developing nations, has advanced beyond a consumer nation. There are several companies manufacturing pesticides in India for use and for export to other developing nations especially Asia and Africa. India also witnessed the worst disaster in the history of manufacturing pesticides. The Bhopal industrial accident resulted in the lost of thousands of lives. The accidents presented a challenge to the government and people of India on safety in the industry for both manufacturing and used of pesticides.

Today India had one of the toughest laws in the manufacturing industry and has tried to adhere to the guidelines as set up by the international code of conduct of the United Nations, on the distribution and lost of lives. They have tough laws but the enforcement is lacking, as most part of the country is still developing and most of the farmers are not literate, presenting a similar problem to those of other developing nations.

The environmental and forest ministry is responsible for making sure that all environmental laws, including pesticide laws, are enforced. Chemicals are categorized by their severity, following the same steps set up by the international community. The Trade and Industry Department guides the export and trade of pesticides, which is responsible

for assisting companies in India; find markets for their products for export.

Despite the efforts by Indian companies to adhere to regulations set up by the government and the United Nations Code of Conduct on the use of pesticides. It still has its problems similar to those of other developing countries. The laws and regulations are not strictly followed, and even when they are followed the importing country often has strict enforcement laws and weak regulations on the trade of pesticides. Even when laws and regulations are in place, the need or demands for pesticides often outweigh them.

Pesticide Policies in Zimbabwe

In view of the increasing dependency on consumer preference of pesticides, the Zimbabwean government is currently refocusing its policies on pesticide use and policies in the country. They are reviewing different case studies on the productivity of different pest management options, both in the large and small scale-farming sector. Also in review is the impact of health damage on small and large-scale farms' need assessment in order to formulate a better national policy. The country is also reviewing its importation policies of pesticides since most of its pesticides are imported.

The agricultural sector in Zimbabwe accounts for 15-20 percent of the nations, GDP, underscoring the importance of pesticide use. Sixty percent of Zimbabwe's foreign exchange is from sales of agricultural products. It is estimated that the agricultural sector of Zimbabwe consumes $60 million worth of chemical pesticides making the country a major consumer of pesticides in Sub-Sahara Africa.

Zimbabwe just like most developing nations is faced with the task of balancing between the ever increasing demand for pesticides and the obligation from international

agreements restricting the use and importation of specific pesticides such as the phasing out of methyl bromide and the eradication of DDT.

The government of Zimbabwe is also concerned with health consequences of indiscriminate use of pesticides as a result it has continued to encourage as a matter of a national policy, pest management and agricultural development specialist to engage in a constructive dialogue on the future strategic options in crop protection.

Zimbabwe is currently shifting its focus toward an integrated approach to pest management to ensure environmental and health safety. The present legislation in Zimbabwe deals with manufacture, distribution and sales of pesticides only, with little emphasis of its use at the farm level.

Despite all these policies 50 percent of all farm workers are exposed to organophosphate pesticide compounds during the one season of spraying. There is minimal protection on the use of protective clothing among farm workers coupled with knowledge of health hazards of pesticides that contribute to significant exposures to pesticides in Zimbabwe. The government is still working to eradicate the use of DDT, which is used for the eradication of tsetse fly and malaria mosquito control.

In conclusion, Zimbabwe just like most developing nations, is faced with a task of how to reduce problems associated with improper use of pesticides. They are however, moving in the right direction by introducing a participatory training approach on integrated pest management (IPM) in small-scale cotton production. The government is also planning as matter of policy to adopt a farmer-centered extension and training on pesticide use in the country.

CHAPTER V

FARM PESTICIDE POLICIES IN NIGERIA

Background Information of Nigeria

Nigeria is the most populated country in Africa with an estimated population of 130 million and one out of every five Africans is a Nigerian. About 70 percent of Nigerians are farmers, making the use of pesticides necessary for crop production.

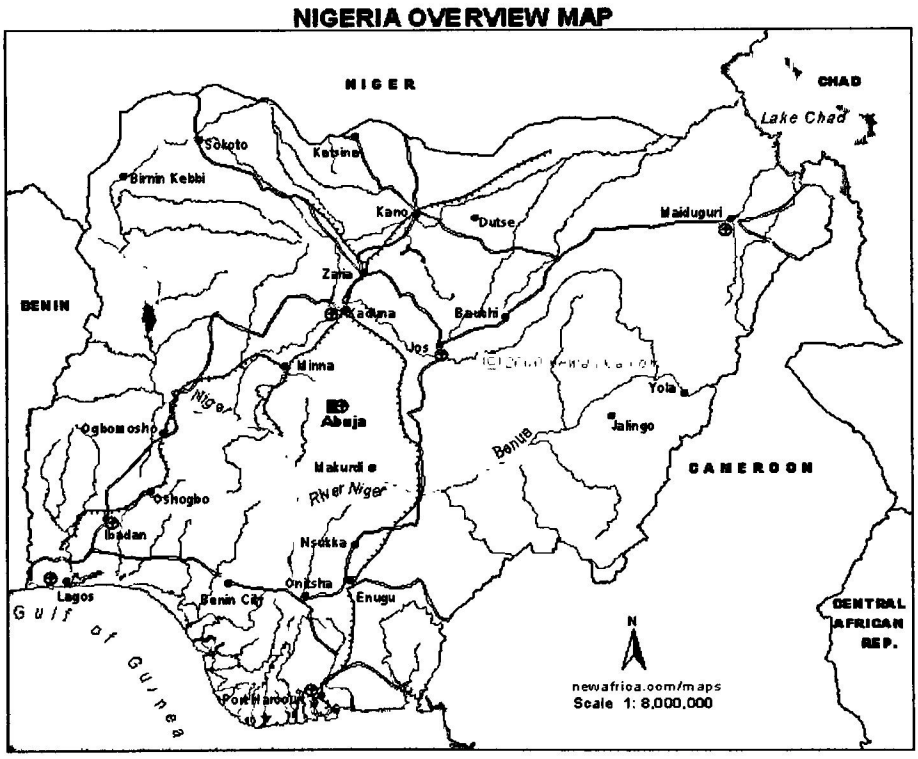

Figure 5.1 Map of Nigeria (source http://www.newafrica.com/maps/overview.asp?country1D=38)

Nigeria is located in the West African region of continental Africa

- The geographical coordinates are 10.00N, 8.00E
- Nigeria borders:

Niger on the North

Cameroon on the East

The Atlantic Ocean on the South

Benin Republic on the West

Chad Republic on the Northeast

Size: 923,768 square kilometers.

Boundaries: Southern limits set by Gulf of Guinea (bights of Benin and Biafra); inland frontiers shared with Cameroon (east), Chad (northeast), Niger (north), and Benin (west).

Topography: Five major geographic divisions: low coastal zones along Gulf of Guinea; succeeded northward by hills and low plateaus; naturally divided into three regions Niger-Benue river valley; broad stepped plateau stretching to northern borders with highest elevations over 1,200 meters; mountainous zone along eastern border, which includes country's highest point (2,042 meters).

Climate: Tropical with variations governed by interaction of moist southwest monsoon and dry northeast winds. Mean maximum temperatures of 30-32°C (south), 33-35°C (north). High humidity in south February-November, June-September in north; low humidity during dry seasons.

Environmental and Pesticide Problems in Nigeria

In Nigeria every state of the federation suffers from one form of environmental and pesticide or the other in varying degrees. The northern part of the country suffers greatly

from desert encroachment, resulting into wind erosion while the southern part is being washed away into the ocean due to heavy rains. And because of this, most of the nations foci combating erosion with little emphasis on the problem of pesticides. Wind erosion could be quite severe in States such as Sokoto, Zamfara, Kebbi, Katsina, Kano, Jigawa, Borno, and Yobe.

Due to high demand of pesticides, it has become necessary for most farmers to introduce the use of massive aerial and ground spraying of mostly uncontrolled use of agrochemical, without consideration to the concomitant problems of chemical persistence in the soil in humid areas and soil-crust formation in arid climates, which contributes to salinization and destruction of vast agricultural lands. These pesticides, which are mostly synthetic were introduced to Nigeria in the 1940s, and until the 1950s, the World Health Organization was using pesticides like DDT, Dieldrin, and HCH in various formulations for the control of endemic and epidemic diseases. Thus, Nigerians became increasingly aware of the advantages derived from pesticides.

Furthermore, in an effort to increase food production, the use of pesticides also increased without due consideration to hazardous effects of the use of these chemicals. The fetal situation of pesticides in developing nations of Africa can be exemplified by the Nigerian case.

The majority of the pesticide used belongs to the organophosphorus and carbamate groups. Because there is no regulation of the use of organochlorine pesticides in Nigeria, many of them, notably hexachlorocyohexane (PCP), and Chlorophenothone, dicophane (DDT), are still very much in use in different formulations for the control of pests in cocoa, cotton, yams, groundnuts, cowpea, vegetables and stored vegetables. DDT,

DDT/HCH, Aldrin, and Lindane are used in a large number of vector control programs, especially in the northern part of the country.

By 1970, 21 types of organochlorine, organophosporus, and carbamate pesticides were introduced for use against pests and food crops, ornamental plants and stored products as well as insects of veterinary and medical importance. Today, more than 200 different brands of pesticides are marketed and the number is likely to increase with the high demand for good quality agricultural products (FEPA 1991). Because of the large quantity of pesticides marketed and used, it has become necessary to examine the adequacy of the policies set up by the Nigerian government to ensure safety of farmers in light of the problems associated with pesticides and the dangers of improper use. This and other environmental problems led to the creation of Nigeria's Federal Environmental Protection Agency (FEPA) in 1988.

Nigeria's Policies and the Creation of FEPA

The Federal Environmental Protection Agency (FEPA) of Nigeria was created in 1988 by decree No. 58 with the statutory responsibility for overall protection of the environment. To this effect, FEPA established guidelines and standards generally based on available data, which FEPA indicated were scanty. To make a complete record of guidelines and standards, FEPA had to follow those guidelines set up by international organizations and those of industrialized nations. Among the many guidelines and standards, FEPA's position on chemicals is clearly specified with pesticides included in the framework but dependently stated. The environmental policy required that "All manufacturers must submit the chemicals in use to the nearest FEPA office before they sold to buyers. Details about stored chemicals and storage conditions should be submitted. When such chemicals are sold, names of secondary buyers should be made known to FEPA office (FEPA 1991)."

FEPA concentrated more on other hazardous waste with the mention of pesticides within that framework and some of the banned pesticides fall within the group of hazardous waste. Guidelines on how to report accidents are also provided but little is provided with regards to the training of users of the dangers and proper procedure of acquiring, applying and disposition of pesticides.

Guidelines, on the management of banned chemicals and hazardous waste were issued. Among those that directly or indirectly affected, pesticides were that the government agency should:

(a) Maintain up to date register of toxic, hazardous, and radioactive substances;

(b) Control the generation and importation of toxic, hazardous and radioactive chemicals

and ensure that those banned pesticides will be stringently controlled;

(c) Monitor the effects and control of all phases of the life cycle, and of all substances; likely to have an adverse impact on human health and environment;

(d) Determine and use environmentally safe and technologically sound techniques for disposal of toxic waste, hazardous and banned chemicals, radioactive waste.

In issuing these general guidelines FEPA made it clear that the generator of a waste or restricted chemical must cooperate with the enforcement agency to ensure smooth removal of such chemical. The objective of the guidelines set up by FEPA on the management of chemicals and solid waste system was to ensure that:

(a) Dangerous and solid waste materials are immediately removed from the environment without causing any public health hazard;

(b) Rules and guidelines are strictly adhered to without any compromise;

(c) Provision for surveillance and monitoring of dangerous and extremely hazardous waste and substances are in place until they are deoxidized, reclaimed, neutralized or disposed of safely;

(d) A system that encourages recycling, reuse, reclamation and recovery to the maximum extent possible;

(e) The management system of dangerous pesticides provide the form and rules necessary to establish a system for manifesting, tracking, reporting, monitoring, record keeping, sampling and labeling dangerous and extremely hazardous chemicals are in place.

FEPA also gave the following criteria and characteristics for grouping or categorizing a chemical dangerous or hazardous:

(a) It falls into the list provided by FEPA;

(b) There is a specification of the original name or generic name that falls into the list as provided by FEPA;

(c) Any residue or contaminated soil, water, or other debris resulting from the clean up spill chemical is tested and falls into the group as provided by FEPA.

Materials or items described as dangerous or found in the list as provided by FEPA will be:

(a) Discarded, burned or incinerated according to the guidelines provided by FEPA and this must be done following procedure and under proper supervision;

(b) Burned as directed and burned for any other use such as energy or any other unintended use;

(c) Applied to the land for their intended use and not used for any other unintended use;

On the use of dangerous waste mixtures, FEPA had provided the following guideline that a dangerous waste or chemical mixture will be any waste about which some or all of its constituents and concentration are known and which have not been designated as:

(a) A discarded chemical product;

(b) An infectious dangerous waste;

(c) A dangerous waste source.

A person or company that has dangerous chemicals will use data, which is available to him and when such data is inadequate for the purpose of use that person should then refer to FEPA exclusive lists of Registered Dangerous Substances in order to determine:

(a) The toxicity data or category for each known constituent in his waste;

(b) Whether or not each known constituent in his waste is a halogenated hydrocarbon or a polycyclic aromatic hydrocarbon with greater than three rings and less than seven rings;

If a person or company has toxic waste or chemicals, he will determine the toxicity of the chemical comparing it to the toxicity level guideline as provided by FEPA. The toxic category for each constituent may be determined directly from FEPA Registry and checking this data against a toxicity category as provided in the following table. If data is available for more than one of the four toxicity criteria, then the most acutely toxic categories will be assigned to the constituent.

Table 5.1.The degrees of toxicity decreases from X to D with X being the most acutely toxic categories.

TOXICITY CATEGORY TABLE

Category	Tlm96(fish) Aquatic (Fish) or LC50 mg/l	Oral(rat) LD50	Inhalation (Rat) LC50 (mg/kg)	Dermal (Rabbit) LD50 (mg/kg)
X	0.01or less	0.5or less	0.02or less	2or less
A	0.01-1	0.5-5	0.02-0.2	2-20
B	1-10	5-50	0.2-20	20-200
C	10-100	50-500	2-20	200-2000
D	100-1000	500-5000	20-200	2000-20000

Source: Guidelines and Standards for Environmental Pollution control in Nigeria; Federal Environmental Protection Agency (FEPA); Toxic Category Table, pp 98; 1991.

On containers, FEPA recognizing the dangers, which empty containers cause after the chemical has been used issued the following general guideline. That if the container or inner liner held extremely hazardous waste, or pesticides bearing the danger or warning

label, the container or inner liner will be rinsed at least three times with an appropriate cleaner or solvent. The volume of cleaner or solvent used for each solvent will be 10 percent or more of the containers or inner liners capacity. In lieu of rinsing the containers that might be damaged to make unusable by rinsing with liquids (e.g., a fiber or card board container without inner liners), an empty container may be a vacuum cleaned, struck three times with the container facing upward to remove to remove or loosen particles from the inner walls and corners, and vacuum cleaned again. Equipment used for vacuum cleaning of residues from the container or inner liners must be decontaminated before discharging them in accordance with procedures approved by FEPA.

Any rinsed or vacuumed residue, which results from the cleaning of containers to inner liners will, whenever possible should be reused in a manner consistent with the original intended purpose of the substance in the container or inner liner. In the case of the farmer, if the reinstate is a pesticide residue then the reinstate will be managed or reused in a consistent manner with the instructions on the pesticide label, provided that when the label instruction specifies disposal or burial, such disposal or burial must be on the farmer's own (including rented, leased or tenanted) property.

FEPA's goal was to protect the country's natural resources and improve the way environmental problems were handled. To ensure safety of pesticides use the Federal Environmental Protection Agency's guidelines for effective use of the chemicals are that all pesticides sold or distributed in Nigeria must be registered by FEPA (FEPA 1991). After the set up of FEPA, the Agency developed policies and strategies for achieving sustainable development in fourteen major sectors of economy; among those was the

sector on Agricultural Chemicals. Under this sector was the responsibility of the Director General of FEPA on monitoring the state of the nation's environment. Because of this responsibility vested on the Director General of FEPA, he set up a council to assist him in implementing and monitoring all these sectors of the environment. He also set up five zonal offices in various parts of the country designed to carry out liaison functions and enhancing environmental function activities in the neighboring states. Some of them were also charged with collection of environmental data.

The Director General of FEPA coordinates with other directors and managers responsible for environmental problems in the various states of the federation. This is to ensure maximum state participation and the harmonization of inputs and approaches in solving environmental problems the country faces. Each of the federation was also mandated to establish FEPA office for effective management at the state level. A laboratory was also established to facilitate the effective monitoring of air quality, land and water waste monitoring.

General Guidelines for Industries Producing Pesticides and other Chemicals

FEPA provided the following guidelines for industries manufacturing pesticides and other chemicals to ensure safety standards in the market:

1. No industry will release toxic substances into the air, water and land of the Nigerian government, beyond permissible limits.
2. It is mandatory for all industries to have industrial pollution monitoring capabilities within their own set up. Preferably they should have on a site pollution control unit or assign it to a consultant/contractor approved by the FEPA.

3. Records of all discharges (solid, air and liquid), treatment and disposal must be remitted to the nearest FEPA office on a monthly basis.

4. In the event of unusual disposal and treatment of waste, such reports should be filed with the nearest FEPA office within 24 hours.

5. Any accidental discharge must be reported to the nearest FEPA office and nearest community within 24 hours of the release.

6. All manufacturers must submit the chemicals in use to the nearest FEPA office. Details about stored chemicals and storage conditions should also be submitted. When such chemicals are sold, names of a secondary buyer should also be made known to FEPA office.

7. FEPA offices will serve as pollution response centers for coordinating response activities.

8. Each manufacturer should draw up a contingency plan against accidental release of pollutants.

9. Each manufacturing industry should set up machinery for combating a pollution hazard and maintain equipment in the event of an emergency. Toward this end, stocks of response equipment should be available or readily accessible.

10. In case of chemical or a pollution emergency, the nearest FEPA office will be the "On the Scene Coordinator," which should coordinate response activities.

11. No individual or corporate body will engage in storage and transport of harmful toxic waste within Nigeria without a permit by FEPA as stipulated by decree 42 of November 1988.

12. The collection, transport and final disposal of waste should be the

responsibility /liability of the company generating the waste which will be liable for clean up, remedy, restoration, and where necessary, compensation to all affected parties.

13. Each state will designate industrial layouts, which will be separate from residential areas. A buffer zone will be provided and rapidly enforced and monitored for illegal development.

14. All new pollution sources that will come on a stream after the enactment of these guidelines will be encouraged to adopt in-plant waste reduction and pollution reduction strategies.

15. No new point sources of industrial pollution will come on a stream without compliance with the provisions of these guidelines.

16. All discharges of affluent with constituents beyond permissible limits into public drains, streams, rivers, lakes, sea or underground injection are unacceptable and prohibited unless a permit is obtained from FEPA or any organization so designated by FEPA. All permits (notices, order, consent, or demand) will be in writing.

17. Solid waste generated by industry including sludges and all by-products resulting from operation pollution abatement equipment will be disposed of in an environmentally safe manner as prescribed in these guidelines. Under no circumstances should any of these substances be co-disposed in any municipal landfill.

18. For the present point and non point sources of industrial pollution, it is hereby stated that all industries with potential for the release of gaseous,

particulate, liquid or solid untreated discharges are mandated to install into their system, appropriate abatement equipment in accordance with the prescribed guidelines.

19. The general aesthetic sanitary conditions of factories and surroundings will be adequately maintained.

20. Within the limits of the provisions by the national policy on the environment, the safety of workers from exposures to hazardous conditions in the work place, should be guaranteed.

21. Environmental auditing of existing industries and environmental impact assessment of new industries and major development projects will be mandatory.

Partial Lists of Hazardous/ Dangerous Chemicals

The list provided in the table below is a compilation of chemicals and substances considered dangerously to human and environmental health. It is provided by FEPA as a guideline to manufactures, importers and users. The chemicals listed can only be imported into the country or produced locally after clearance with FEPA and other relevant agencies. FEPA also reserves the right to exclude from these lists any categories or items, which it determines do not represent a potential hazard to human health and the environment when improperly treated, stored, transported, disposed off or otherwise improperly managed. FEPA also has the exclusive right to add or remove any chemical from the list whenever it considers its dangers or usefulness. The table below is a partial list of some dangerous chemicals including pesticides as listed by FEPA.

Table 6.1.Partial List of Hazardous Chemical Products

Hazardous substance Chemical #	Designation of Hazardous chemicals
FA023 Acetaldehyde, Chloro	EHW BH
FB001 Acetaldehyde	EHW C
FB034 Acetaldehyde, trichloro-	EHW H
FA002 Acetamide, N-(aminothioxomethyl)	EHW B
FA057 Acetamide, 2-fluoro-	EHW BH
FA058 Acetic acid, flouro-, sodium salt	EHW AH
FB144 Acetic acid, lead salt	EHW DEP
FA066 Acetimidic acid, N-(methylcarbamoyl) thio., methyl ester	EHW B
FB003 Acetonitrile	EHW CI
FA001 3-(alpha-Acetonyl-benzyl)4-hydrixycoumarin and salts	EHW A
FA002 1-Acetyl-2-thiourea	EHW B
FB006 Acetyl chloride	EHW CHOR
FB003 Acrolein	EHW XI
FB007 Acrylamide	EHW C
FB008 Acrylic acid	EHW COL
FB009 Acrylamide	EHW C+1
FA070 Aldicarb	EHW B
FA004 Aldrin	EHW XH
FA005 Allyl alcohol	EHW B1
FA006 Aluminium phosphide	EHW BR
FA007 5 (Aminomethyl)-3 isoxazolol	EHW B
FA008 4Aminopyridine	EHW B
FA009 Ammonium picrate	EHW B
FA119 Ammonium vanadate	EHW B
FB012 Aniline	EHW C1
FA010 Arsenic acid	EHW B
FA012 Arsenic (III) oxide	EHW B+
FA011 Arsenic (V) oxide	EHW B
FA011 Arsenic pentoxide	EHW B
FA012 Arsenic trioxide	EHW B+
FA038 Arsine diethyl-	EHW B
FA015 Azaserine	EHW C+
FA054 Aziridine	EHW B+
FB010 Azirino (2,3:3,4) pyrrolo (1,2a) indole 4, 7-dione, 6-amino-8(aminocarbonyl oxy methyl) –1,1a,2,8a, 8b-hexahydro-8a-methoxy-5-methyl	EHW B+
FA013 Barium cynide	EHW A
FB157 Benz (j) aceanthrylene, 1, 2-dihydro-3-methyl-	EHW HP
FB017 Benzyl chloride	EHW DH
FB049 Benzenamine, 4-chloro-2-methyl	EHW H
FA028 Benzyl chloride	EHW PH+
FB176 Carbamide, N-ethyl-N-nitroso	EHW C+
FA022 Carbon bisulphide	EHW D1

FA022 Carbon disulphide	EHW	D1
FB033 Carbonocholoridic acid, methyl ester	EHW	BHI
FB211 Carbon tetrachloride	EHW	CH+
FA095 Carbonyl chloride	EHW	BH
FB033 Carbonyl fluoride	EHW	BHR
FB037 Chloroform	EHW	BH1
FB041 1-Chloroethyl vinyl ether	EHW	CH+1
FB057 Cyclohexanone	EHW	C1
FB240 2,4-D, salts and esters	EHW	BH
FB060 DDD	EHW	CH+
FB061 DDT	EHW	XH+
FB142 Decachlorooctahydro-1, 3, 4, 5, 5-hexachloro-	EHW	XH
FA133 Diamine	EHW	B+R
FB068 Methylene bromide	EHW	CH
FB029 Methyl bromide	EHW	H

Source: Guidelines and Standards for Environmental Pollution Control; Federal Environmental Protection Agency of Nigeria (FEPA) pp 156-172, 1991.

Nigeria and the International Environmental Policy Guidelines

Nigeria has made significant effort since the Rio Conference (1992) on environmental policies and sustainable development, which was organized by the United Nations Conference on Environment and Development (UNCED). There has been concerted effort to comply with the conference guidelines; most of the policies and guidelines set up by FEPA are in line or the same with those set up by UNCED. Land degradation remains the greatest problem in Nigeria affecting agricultural production in the country, with high levels of water and air pollution, illegal use of chemicals including pesticides, depletion and desertification being other areas of major concern. Nigeria's FEPA concentrated its concerns on policies in these areas. Apart from the national environmental problems, Nigeria has to contend with global environmental problems such as ozone layer depletion, global warming and the consequent climate change, as such the importance of harmonizing its policies and guidelines in line with the international community.

In 1992, the Federal Environmental Protection Agency (FEPA) was given a broader mandate over natural resources conservation and its functions were enhanced to a ministerial status within the presidency. The mandate of FEPA, as well as the establishment of the National Planning Commission along with the existing ministries, provided the framework for the integration of environmental concerns to the nation. The creation of FEPA was aimed at not only taking care of environmental problems in Nigeria but also fostering international cooperation on environmental matters between Nigeria and the international community.

FEPA focused its agenda for environmental protection and natural resource conservation in the country by creating national policies and working with other ministries to formulate sound policies that help direct the agency. The National Policy on the Environment and Appropriate Legislation, Guidelines and Standards for Environmental Impact Assessment have been reviewed to strengthen the challenges of Agenda 21, which was a guideline set up at the Rio Conference on environment and development of 1992.

The Government has also evolved through relevant agencies a sound planning and management of land resources in the country. Various programs including soil survey and testing to determine fertility, and accumulation of pesticides and other chemicals, land evaluation, fertilizer testing, fertility management and soil conservation have become a policy function of FEPA on environmental implications.

The Ministry of Agriculture and Natural Resource, which has a major interest on the use of pesticides as well as that of Water Resources and Rural Development, were mandated to form the Federal Government policy on biological diversity. Taking into

consideration the relevant provision of the Convention on Biological Diversity, geared towards conservation of vital resources. The Federal Government put in place an Action Plan on water pollution control and biological diversity conservation in the Niger Delta area of the country. Internationally, collaborative efforts were made with the West African sub-region under the Gulf of Guinea Large Marine Ecosystem (GOGLME) project aimed at monitoring coastal waters in terms of pollution and biological diversity conservation. One of the problems of pollution is the contamination of water by pesticides and other chemicals.

Nigeria has also put in place hazardous chemicals and toxic wastes dump program and established a FEPA/University of Ibadan Linkage Center to carry out research and training in the area of industrial, domestic and hazardous waste management. Some pesticides are grouped as hazardous and toxic chemicals.

Nigeria has set up policies within the framework of specific and local environmental problems in the context of the priorities identified by the National Committee on Agenda 21, as listed below:

1. Forest Protections and Erosion Control;
2. Management of Municipal Solid Wastes;
3. Combating Desertification and Mitigating Effect of Drought;
4. Rational Use of Oil and Gas Resources;
5. Protecting and Managing Water Resources,
6. Sustainable Human Settlement;
7. Managing Mining Sites and Restoring Mining Wastelands;
8. Managing Toxic Chemicals and Hazardous and Radioactive Wastes;

9. Emergency Preparedness and Management;
10. Flood Management Control of the Infestation of Water;
11. Improving and Coordinating Implementation of Environmental Management;
12. Integrating the Environment into Development Plan Decision Making;
13. Harmonizing of Federal and State Responsibilities for Environmental Management;
14. State and Local Government Responsibilities;
15. Creating and Improving Capacity for Sustainable Development;
16. Internalizing Environmental Costs through the use of Economic;
17. Instruments in the Management of Natural Resources and Alleviating Poverty;
18. Promoting the Research and Development of Environmentally Sound Technology;
19. Forging Viable Partnership among various Stakeholders and Interest
20. Groups both at National and International Levels;
21. Managing Environmental Information for Sustainable Development.

In the areas of chemicals Nigeria has to deal with the problem of toxic waste and other global problems such as global warming and the ozone layer depletion and consequently climatic change. To contain these problems the expanded mandate was given to FEPA over natural resources in 1992.

The policy of the FEPA is to work with other departments and organizations to improve environmental condition of the ministry. To achieve this the government in 1989 launched Policy on the Environment. Specifically the policy contained guidelines for achieving sustainable development in fourteen vital sectors of the nation's economy.

The Government of Nigeria, through the Ministry of Water Resources and Rural Development, is undertaking a number of programs designed to protect the quality and supply of freshwater resources in the country. On going activities in these program areas are briefly summarized below:

Integrated Water Resources Development and Management. In this program area, the Ministry of Water Resources and Rural Development has carried out two activities. These are preparation of the Nation's Water Resources Master Plan for the period 1995-2020. This Decree gives the legal framework for the development of the water resources of the country. It places ultimate responsibility for the proper development of the nation's water resources on the Ministry of Water Resources and Rural Development.
The Ministry has a program for arresting the massive ecological problems of the nation in the rural areas and restoring the land as much as possible. This is an on going program, which draws its funds from the 2 percent Ecological Fund.

The Federal Environmental Protection Agency (FEPA) is coordinating the program within the country. Participating agencies include the National Institute for Freshwater Fisheries Research (NIFFR), New Busa and the National Water Resources Institute (NWRI), Kaduna. A network of stations on rivers, lakes and reservoirs has been established and instrumented for the purpose of collecting samples.

Environmentally Sound Management of Toxic Chemicals received serious attention Following the provisions of the Waste Management Regulations S.I. 15 of 1991. The Hazardous Chemicals and Toxic Wastes Dump Program were put in place in 1992, in addition to the total ban on importation, transit, transportation, deposit and storage of harmful wastes that have existed since 1988. Under this program, Federal Environmental

Protection Agency (FEPA), officials operating at the seaports in the country can take samples of any suspicious consignment camouflaged as industrial materials for analysis in the Reference Laboratory of the Agency. Besides, FEPA has embarked on chemical tracking by monitoring warehouses and outlets for the safe handling, storage and disposal of imported chemicals. The effort has succeeded in intercepting a host of banned and expired chemicals as well as toxic wastes camouflaged as raw materials and products. In line with some of the provisions of the Basel Convention, the Federal Government approved a FEPA-University of Ibadan-based Center of Excellence to carry out training and research in the areas of: industrial, domestic and hazardous wastes management; development or adaptation of cleaner production technology for Nigeria; education on gaseous emissions; and incorporation of "waste to wealth" strategy into waste management practices. In a similar development, the Ministry of Science and Technology has initiated a program for the identification of major pollutants, monitoring and controlling the effect of pollutants on the environment, developing process technologies for combating industrial pollutants, establishing model treatment plants for demonstration and skill acquisition, converting solid wastes into energy and other useful purposes. Achieving compliance with both international and national regulations, standards and guidelines on hazardous/toxic chemicals and radioactive waste management. Nigeria has national regulations on hazardous/toxic chemicals and wastes and is also involved in the implementation of some of the International Convention, Procedures and Protocols on Hazardous/Toxic Wastes and Chemicals and Radioactive Waste Management. By the year 1998, Nigeria will develop national regulations on the Basel Convention on Transboundary Movement of Toxic Wastes; Procedures/Protocols on "Prior Informed

Consents" on Hazardous Chemicals in International Trade, etc.

FEPA spelt out the following strategies for the management of hazardous wastes:

1. Require and assist industries to change to cleaner production methods and adopt preventive and recycling technologies.
2. Encourage the phasing out of processes that produce high risks because of hazardous waste generation.
3. Carry out environmental audits of existing industries to improve hazardous waste management.
4. Producers to be responsible for the environmentally sound disposal of the hazardous wastes they generate.
5. Establish public awareness and training programs for industries and government workers on hazardous waste issues especially waste minimization.
6. Build treatment centers for hazardous waste either at national or state level. Industries should treat, recycle, re-use and dispose of wastes at or close to the site where they are created.
7. Create alert systems to detect illegal traffic in hazardous wastes.

Guidelines for the management of toxic chemicals and the control of chemical hazards through pollution prevention have been spelt out by FEPA as follows: Emission inventories, product labeling, proper procedures for safe handling and exposure. Phase out or ban high risk chemicals that are toxic persistent and bio-accumulative and whose use cannot be adequately controlled or monitored. Develop policies, which will be based on principles of producer/ polluter liability. Emphasize the use of biological control methods for pest-control. Provide information on a chemical hazard in local languages.

Establish emergency-response centers including poison-control centers. Control the importation of banned or restricted chemicals/pesticides. Adopt community right-to-know programs that provide information on accidental releases and annual routine emissions of toxic chemicals.

Companies are encouraged to practice environmentally sound management of solid wastes and chemicals and promote education and awareness on waste prevention; separation of waste at a source of generation and other environmentally sound municipal waste management approaches. FEPA also encourages companies to develop and implement through the collaborative approach the national guidelines and blue print for integrated management of municipal solid waste.

The agency realized that environmental laws and regulations are important but cannot alone be expected to deal with the problems of environment and development. Other factors such as the prices, markets and governmental fiscal and economic policies also play an important role in shaping attitudes and behavior of the society towards the environment and use of chemicals. The broader community shoulders the costs in the form of damages to health, property and ecosystems. At the same time these various forms of damage including declining human, industrial and agricultural productivity results into lower production of crops and other goods affected by the use of pesticides and other chemicals.

The main objective of the Environmental Management Project (EMP) is to assist the country in its efforts toward environmental sustenance, and hence, human development through the following specific activities: Institutional Strengthening: Provision of Laboratories at both Federal and State Environmental Agencies in order to enhance

monitoring of environmental components.

The United Nations Development Program (UNDP) in 1993, the UNDP offered to support the National Program on Environmental and Natural Resources Management for Nigeria. The support focused essentially on capacity building in all the program areas identified. This is to enable the environmental agencies of the government of Nigeria at both Federal and State level, Non-Governmental Organizations (NGOs) and local communities to design, formulate, manage, implement and sustain their own environmental protection programs. Specifically, the target objectives of the program include the strengthening of national capacity for formulation of environmental policies, legislation and enforcement; increased awareness and conservation of the environment; preparing national Agenda 21 and an action plan for its implementation; training of staff of FEPA, State Environmental Protection Agencies and other national bodies to enable them to carry out their work program on a self-sustaining basis.

To implement the program FEPA decentralized it among the relevant organizations not only in compliance with the national policies on environment but also to enhance full participation. Federal Environmental Protection Agency (FEPA) also has the responsibility of implementing program outputs for the environment, while the implementation of environmental education in all the nation's schools carried out by the Nigeria educational research and development council.

FEPA believes that in its bid to implement Agenda 21, has not only strengthened the existing state environmental protection agencies, but also has encouraged the establishment of offices in all the states of the federation. To ensure implementation of environmental policies, guidelines for the establishment of state policies have been

developed and forwarded to these States. FEPA sets up regular meetings between the Agency and the state environmental protection agencies

To ensure strict compliance of environmental laws, FEPA set up an environmental enforcement training center to train environmental officers at both federal and state levels as well as those in the private sector. Making Sustainable development requires intelligent environmental decisions. Sound environmental decisions can only be made with the help of timely, relevant and reliable information. Bearing these facts in mind and, in line with recommendation 101 of the 1972 Stockholm Conference on the Human Environment as well as the concern expressed at the UNCED in 1992, the Federal Environmental Protection Agency (FEPA) as the coordinating Agency for environmental issues in Nigeria has taken concrete steps to facilitate the acquisition and exchange of environmental information before and since after the UNCED at Rio in 1992. Efforts of the Agency in this regard include:

I. The establishment of a Data Management and Information Unit;

ii. The establishment of an environmental reference library;

iii. Nigeria's active participation in the UNEP/INFOTERRA Network.

Data management and information units were established as one of the major components of the World Bank assisted environmental management projects in Nigeria. The project started in 1992 shortly after the United Nations Conference on Environment Development. The data management and information unit is a network in which, FEPA as central node would be connected to other sectoral nodes dealing with forestry, natural resources, land and water resources conservation.

In its efforts to provide the public with excellent and up-to-date reading materials on

environmental issues, the Agency established an environmental reference Library at its headquarters in Abuja in 1994 in addition to the existing library in the Lagos office. The Library is stocked mainly with publications of the agency and those from UNEP, UNESCO and other global donor agencies. The library has 30 serial publications, 33 FEPA publications and 2,000 Monograph titles. The library is currently being expanded and computerized under the World Bank Assisted Environmental Management Project in Nigeria. The facility is being consulted from various Government Agencies, Universities, the private sector and individual consultants all over Nigeria. INFOTERRA Services as part of its efforts to encourage information exchange on the environment, FEPA continues to be an active member of INFOTERRA. INFOTERRA is the global environmental information exchange network with National Focal Point in 174 Nations coordinated by UNEP. Nigeria joined the network in 1974. To date the Agency has forwarded to UNEP 25 local sources of environmental information for inclusion in the International Directory of sources. Additional 35 sources have been identified for registration while a national directory of sources is being compiled for publication. Also, plans are underway to establish sub-focal points in Environmental Protection Agencies in the 36 States of the Federation and the Federal Capital Territory. FEPA is also consulting with UNEP/INFOTERRA on the possibility of establishing an INFOTERRA Regional Service Center for the Anglophone West African Nations in Nigeria.

As part of this program, the Ministry of Science and Technology has established a linkage between the federal, state, local governments for disseminating timely technical data for decision-making applicable to the setting up of cottage, small and medium scale industries. In addition, the ministry is in the process of establishing a wide area network

to link all the Research Institutes for the purpose of information exchange.

CHAPTER VI

PESTICIDE POLICIES IN DEVELOPED NATIONS

The emerging European Union regulatory policies on pesticides more generally coincided with similar developments in United States, Canada and other industrialized nations. In the United States there was the debate on whether the regulatory polices were too stringent for the manufacturers, who felt that the European Union manufacturers had comparative advantage. In Germany environmental groups were urging the country to put in place stronger measures against manufacturers. While the debate between the Atlantic's continued, there was little attention paid to how these policies benefit or affect developing nations.

Pesticide Policies in the United States

An overview of United States pesticide policies show how it has evolved over the years with weak policies in the early 1900s to tougher policies in 1972 and beyond. In 1947 the Federal, Fungicide, and Rodenticide act (FIFRA) was enacted as a result of several legislative maneuvers by the congress. Although these policies were put into law, it was not until Rachel Carson started her campaign on the dangers of pesticide in the late 50s that the public and policy makers started paying serious attention.

United States pesticide policies did not change significantly among the first acts in 1947 and the second act of 1972, despite concerted effort to overhaul the statute. It was even at

a stand still toward the late 70s during the energy crises. The 1947 act was a product of close cooperation between the House Committee on Agriculture and mid-level personnel within the U S Department of Agriculture and representative of major agricultural pesticide manufacturers. Experts on policies of self-regulation therefore reviewed the policies of 1947 to 1972. This was because manufacturers dictate the terms of the acts. In the 1947 act manufacturers were only required to display credible evidence and reliable instructions for use on insuring against harmful effects, largely to keep unscrupulous operators off the market, thereby protecting their interest. There was also no mandate for USDA to check the veracity of the information or the safety of the pesticide. The 1972 act by contrast propelled government into the active regulation of product safety. Producers no longer regulate themselves but instead faced scrutiny by the government.

Pesticide policies before World War II in the U.S. revealed that governments concern with pesticides was more directed toward consumers and agricultural community than the manufacturers were the concerns of quality and cleanliness of food. Proposals for pure food legislation increased with the onset of the twentieth century.

The pure food act was met with resistance; consequently farmers were always afraid of losing the crops while consumers were afraid of buying poisoned food by chemicals. The over regulation continued until in 1947 when the federal policy act was enacted. This law made it more problematic for FDA to enforce because it was too expensive and cumbersome. Farmers on the other hand could not interpret the basic law. The only thing this policy helped FDA enforced was the proper labeling of chemicals on their containers. When the idea of pre market inspection was introduced, some industry representatives saw it as unnecessary and wasteful, arguing that the USDA should make it voluntary and

focus instead on illegal operators.

When Rachel Carson published "Silent Spring" in 1962, pesticide concern became a household issue. The awareness created by Carson led to clubs like the Sierra club campaigning vigorously against the use of pesticides like the DDT and other environmental pollutants. In 1966 the club purchased advertisements in major newspapers urging the public to fight the indiscriminate use of pesticides. The National Audubon society, backed by Rachel Carson fund, provided funds for a campaign on the misuse of pesticides and their primary target was DDT. Another fund, the Environmental Defense fund (EDF) also fought vigorously on pesticide issues.

The campaign by these societies created a favorable awareness among the public leads to major policies, which later led to the enactment of the 1972 act and the creation of EPA and the outlawing of DDT. The influence of these societies was not only felt in the United States but worldwide especially among industrialized nations which now led FAO to create the international code of conduct on pesticide use. The United States was part of the conference that led to the creation of the code.

In conclusion, from the 1900s to the 1960s when pesticide use was in its infancy, the US legislators were more interested in encouraging the adoption of new technology than controlling pesticides. The turn around occurred with the publishing of Silent Spring by Rachel Carson, which brought public awareness and activists to the forefront of the debate. Since then, public demands for protection from health hazards and the environmental hazards forced FIFRA and EPA to make many changes and enforce existing laws. The EPA took full authority of FIFRAs administration and pesticide regulatory functions when it was created in 1970 and was amended by the Federal

Environmental Pest Control Act (FEPCA) in 1972. This act mandated the registration of all previously registered pesticide products (FIFRA 1996).

In general the regulatory process of EPA has modified some pesticide registrations and removed some materials from the market that are considered hazardous to human health and environment. Despite the legislation on pesticide use, manufacture and sales by the congress, there continued to be areas of concern in the field and scope of regulation and registration. There were those who believed that the pesticides should be completely banned, while others wanted a partial banning. There are also those who believed that there is too much control on the manufacture of pesticides without any proof of the serious effects of pesticides.

The U.S. regulatory effort to develop export controls on pesticides has always been made with resistance both within and outside the country. The difficulty the US has had in taking the lead in resolving the pesticide trade dilemma is because it is the major manufacturer of these pesticides. In 1993, the Department of Commerce valued the U.S. chemical industries at just over $4.5 billion for both domestic and international sales. As one of the largest U.S. industry sectors, chemicals have in the past accounted for approximately 10 percent of the nations export income. The EPA balances the incidence of cancer against the economic advantage to the pesticide industry and its market. Consequently, the U.S. is unlikely to coordinate an international convention absent a commitment by other key chemical producing nations to participate. Leveling the economic playing field by mandating total participation by major chemical exporting nations is the only way to prevent nonparticipating nations from taking economic advantage of participating nations. Thus, far, economic benefits in an under regulated

world market have stifled any incentive to adopt a leadership role to propose a convention or domestic legislation. Trade restricting legislation may inure to the economic detriment of the U.S. because if the U.S. does not export pesticides, another country will.

As a result of these and the lack of regulation, various pesticides restricted in the U.S. were exported to developing nations, only to return as residues concentrated in imported foods and this a major problem for US food chains that import food "especially fruits" from Mid and South America. This problem is so serious that it has been termed the "circle of poison." In 1989, the General Accounting Office (GAO) reported that the circle of poison was a concern because the EPA was not monitoring the content, quantity, or destination of exported, unregistered pesticides under sections 17(a) and 17(b) of the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). Specifically, the GAO found that the EPA does not know whether export notices are being submitted, as required under FIFRA and that notices were not sent for three pesticides (out of four) that were voluntarily canceled [by the manufacturer] because of concern about toxic effects (US GAO Report 1986).

The U.S. is a leading producer of pesticides; contributing 14 percent of the world's export markets. At least 25 percent of the four to six hundred million pounds of pesticides exported annually are not registered with the EPA. The EPA canceled or suspended some of these chemicals because of the dangers they pose to human health and the environment, and in some cases' manufacturers voluntarily withdrew their products. Because the U. S. exports a high percentage of unregistered pesticides, these chemicals have a high potential to reenter this country as residues on imported foods. For example,

Chile is a large market for U.S. manufacturers of pesticides. Included in the 1,460 pesticides used by Chile is Lindane, a substance banned in the U.S; Paraquat, which contains dioxin, and Parathion, a toxic organic phosphate that has restricted use in the U.S. In addition, Chile uses Methyl Bromide. Ironically, these pesticides are either banned or restricted in the U.S., but may be used on produce that is eventually imported by the U.S (US GAO Report 1992).

The U.S. customs service has compiled a public record on pesticide exports. Although the U.S. has taken steps to regulate the domestic sale and use of particularly hazardous substances, exports have escaped similar regulation. At present, the U.S. does not effectively regulate the export of pesticides the EPA has banned or restricted due to health or environmental concerns.

In 1990, it reported the shipment of 465,338,865 pounds of pesticide products from U.S. ports. Although the importance of specificity in identifying and labeling pesticides is critical to human health and the environment, 56.2% of the chemicals exported could not be identified in Customs records beyond the most general terms. Labels generally referred to chemicals in terms such as "agricultural insecticide" or "seed killing compound." A lack of appropriate identification and incomplete labeling precluded an accurate identification of the hazard level for over 73% of the chemicals shipped. Despite these omissions, customs records indicate that 52,022,337 pounds of banned, and unregistered or restricted-use pesticides were exported in 1990. The problem continued between 1992 and 1994, when three-quarters of the exports failed to adequately identify their chemical contents.

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) are the primary US pesticide law, which governs the sale and use of pesticides (NPPC 1). Under FIFRA, pesticides must be submitted to the EPA for review to assess the "tolerance" level of a pesticide residue permitted in foods. The Federal Food, Drug and Cosmetics Act provide EPA the authority to establish the tolerance levels for pesticides (NPPC 1).
FIFRA was passed by congress in 1947 with the U.S. Department of Agriculture (USDA). The primary goal of the law was to protect farmers from ineffective and dangerous pesticides by requiring all pesticides to carry registered labels. Eventually issues arose from various groups concerning health risks and environmental damage from pesticides, which eventually led to provisions of the law.

In 1958 another critical law passed, called the Delaney Clause (provision of Federal Food, Drug, and Cosmetic Act), which became part of the Food and Drug Law (Kolbye 2). Used complimentary with FIFRA in determining acceptable tolerance levels, it was an added protection to consumers for carcinogenic substances, and stated that "no additives will be deemed to be safe if it is found to induce cancer when ingested by man or animal, or if it is found after tests which are appropriate for evaluation of safety of food additive to induce cancer in man or animal."

Issues resulted from this clause by proponents of pesticide use, such as the Agricultural Chemicals Industry, which has lobbied for reform. The main problem for supporting groups of pesticide usage (i.e., the Farm Bureau) is that technology is improving, and the abilities to detect parts per million, or parts per trillion of residues have made this law unreasonably strict for users of pesticides. According to industrial manufacturers of pesticides, the Delaney Clause is extremely powerful because it requires

zero tolerance for any negligible residue traces of pesticides in foods. However, similar issues for pesticide limitation by interest groups have attempted to counter this through other measures in the form of lobbying for stiffer laws on the usage of chemicals and toxins in pesticides.

The Delaney clause has become a powerful tool in severely limiting the usage of pesticides because of more advanced equipment capable of detecting "negligible" trace levels of chemicals. Opponents of pesticide regulation groups such as the Farm Bureau and the Agricultural Chemical Industry viewed the FFDCA provision (Federal Food, Drug, and Cosmetic Act provision) as a threat to the farming industry, which depends heavily on the use of pesticides for sustainable growth and improved agriculture (Sagoff 3).

There have always been lobbying efforts by groups with special interests regarding pesticide policy. Wealthy industry coalitions have successfully used PACs to manipulate policy by giving large contributions of money to members of Congress. Clinton's Food Quality Protection Act of 1996, which repealed the Delaney Clause and relieved the industry from strict regulation over pesticide residue requirements, demonstrated this. Congress cannot ignore the economic benefits to themselves as well as the economy's in using pesticides for improved agriculture. In this respect, wealthy chemical and pesticide producing corporations have been very powerful in Washington.

Environmentally cautious interest groups advocating stricter policies and regulations of pesticides have a longer route because of their lack of financial resources and support to be effective lobbyists. The mobilization of voters has become one of the few hopes that these interest groups have next to education, in order to create leverage for policy

changes. When a few people complain to wealthy industries over a mild skin irritation, nobody listens, but when a few hundred thousand people comment to the USDA, the federal government starts to question its position and involvement in policy. This democratization allows a pluralist society to pursue many interests of its people; or to at least bring the issues out in the open. When regulation becomes too severe however, manufacturing industries of pesticides can always sell their chemicals to third world nations and purchase their crop yields to guarantee the same circulation of undesirable foods in the market. Therefore, lobbying efforts are effective in achieving goals by interest groups, up to a certain point.

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) is the basic statute that the EPA uses to regulate pesticides in the U.S. Pesticides intended for use in the U.S. found to cause an "unreasonable adverse effect" on human health or the environment, may be canceled, suspended or significantly restricted by the EPA. A manufacturer that wishes to register a pesticide product must file efficacy data with the EPA, including the pesticide's formula and labeling, a statement of all claims to be made regarding the pesticide, direction for its use, and the pesticides safety data. FIFRA requires the EPA to register a pesticide if there is a finding that:

> (1) the composition of the pesticide achieves what the manufacturer claims;
>
> (2) labeling and other promotional materials comply with claims and are not deceptive;
>
> (3) the pesticide will perform without unreasonable adverse effects on the environment; and
>
> (4) when used in accordance with generally recognized practices, the

pesticide will reasonably affect the environment.

FIFRA establishes a broad risk-benefit analysis for the EPA to evaluate how a pesticide affects the environment and human health. The statutory mandate to avoid "unreasonable effect on the environment" explicitly directs the EPA to consider the economic, social and environmental costs and benefits from the use of a particular pesticide, in addition to the risks that the pesticide poses to humans or the environment. If a pesticide "may reasonably be expected to result, directly or indirectly, in residues of the pesticide becoming a component of food," EPA regulations preclude the registration of a pesticide under FIFRA until the FDA issues appropriate tolerances for residues under the Federal Food, Drug, and Cosmetic Act (FFDCA). This requirement prevents the registration of a pesticide for food crop use under FIFRA unless the EPA determines that pesticide residue on the crop will not exceed a safe level.

FIFRA represents one of the earliest domestic efforts in the U.S. to control the exchange of chemicals in international commerce. The statute requires manufacturers to label their products in English as well as the language of the importing country. Section 17(a) of FIFRA requires a manufacturer exporting a pesticide to obtain a statement from the foreign purchaser acknowledging that the pesticide is unregistered and cannot be sold in the U.S. The foreign purchaser forwards the statement to the EPA and section 17(a) directs the EPA to send a copy of the statement to the U.S. embassy in that foreign country. The U.S. embassy then provides a copy to the regulating office of the importing country. Additionally, section 17(b) requires the EPA to notify a foreign importer whenever a U.S. pesticide registration is canceled or suspended. Any unregistered, canceled or suspended chemicals in the U.S. can legally be exported with a signed

acknowledgment that the chemical is not subject to restriction in the U.S. FIFRA's section 17 methods of notification provide foreign governments with critical information on unregistered pesticides.

The EPA revised its FIFRA regulations to clarify this area of the statute. For example, the EPA now permits exporters to add information onto the label of the pesticide explaining why a product is not registered, the status of the registration, or its use classification. In addition, exporters are required to use English on the label, as well as the language of the importing country and the language of the country of a final destination when it is reasonably ascertainable.

The EPA also permits exporters to use supplemental labeling. Section 17(a)(1) labeling requirements are met by placing supplemental labeling on shipping containers instead of on the product container. The requirement applies to pesticides that are being "shipped or held for shipment in the United States."

The EPA has made significant progress in resolving language used in labeling pesticides. The EPA now requires that pesticides are labeled in the "appropriate foreign languages. Further, the regulation suggests an exporter has the option of labeling the immediate product, the shipping container of the pesticide, or a combination of the two.

To prevent exposure or misuse of pesticides, full disclosure should be made on both the immediate product and the shipping container. Finally, supplemental labeling requirements apply only to those pesticides being shipped or held for shipment. There are apparently no provisions to prevent exporters from repackaging the pesticide without FIFRA labeling after the product leaves the U.S.

While the federal government has made some progress in dealing with the

very difficult problem of balancing the risks and benefits of pesticides, limitations remain. Thus, some of the same concerns raised by GAO over the last 24 years are still unresolved today. They include:

1. limited progress in reviewing older pesticides in light of current scientific knowledge and standards,

2. difficulties in removing pesticides that are a cause for concern from the marketplace,

3. holes in the safety net designed to provide an early warning of pesticide dangers,

4. groundwater supplies becoming contaminated by pesticides,

5. shortcomings in the monitoring of pesticide residues on food,

6. deficiencies in notifying foreign governments about exports of pesticides that are banned or unregistered in the United States and are being sold abroad,

7. inadequate safety protection for farm workers, and

8. the lack of a coordinated federal strategy to manage key pesticide data.

Some of the problems associated with FIFRA are administrative in nature and do not suggest a lack of concern by the U.S. Although importing nations have frequently failed to receive timely notification of pesticide imports, when the notifications do arrive, there is generally no assurance that the receiving official will forward the data to the user of the chemical. If the user of the chemical does not receive this data, FIFRA's reporting procedure has failed its purpose. Additionally, many chemicals lack efficacy data to include in the notifications because these domestically manufactured chemicals are not

registered for domestic use.

The Federal Food, Drug, and Cosmetic Act (FFDCA) is the national food-standards program for pesticide residues in the U.S. Under the FFDCA, the EPA must establish tolerance levels for pesticide residues that will remain on raw agricultural commodities. If a pesticide is one that "concentrates," or becomes increasingly potent as the raw agricultural commodity is processed into food, the EPA must base tolerances on the processed food. The EPA considers several factors when setting food tolerances. First, the pesticide must be generally recognized among experts as "safe for use." In evaluating the safety of the pesticide, the EPA considers "the necessity for the production of an adequate, wholesome, and economical food supply," and "other ways in which the consumer may be affected by the same pesticide chemical or by other related substances that is poisonous or deleterious." A processed-food tolerance must be set at "zero" if the pesticide would "induce cancer when ingested by man or animal."

In its evaluation of a pesticide for the establishment of a tolerance, the EPA requires that an applicant submit a petition stating the name of the chemical, composition and test results, as well as the amount, frequency and time of application to crops.

AFDC's tolerance setting procedures differ in a number of respects from MRL setting procedures of Codex. The important differences are substantive rather than procedural. The EPA takes a more conservative approach in cancer classification decisions, especially with substances that Codex finds to be non-genotoxic. Similarly, there are differences in residue chemistry analysis, with Codex using more liberal indicator compounds.

Under the Toxic Substances Control Act (TSCA), the EPA may restrict the export of

a pesticide pursuant to Section 12(a) if found to pose an "unreasonable risk" to human health or the environment in the U.S. An exporter is required to notify the EPA of any exports so the Agency can inform the importing country of the shipment. TSCA is domestically protective but offers little assistance to developing nations in regulating pesticide imports. The weakness of TSCA occurs when an exporter labels the product "intended for export," resulting in shipment of the product without notice because it is not intended for use in the U.S. If the pesticide is found to pose an unreasonable risk to human health or the environment in the U.S., TSCA has no prior informed consent provision similar to FIFRA. Instead, the EPA is required to forward a notice of the shipment within seven days of contract execution or by the date of export, whichever is sooner. TSCA's notification system is not designed with the developing nation in mind because it only provides notification to other nations of restrictions placed on U.S. imports. Further there is no requirement for what information is required in the notification. Without a firm PIC procedure and specific information requirements, importing nations are unable to make informed decisions regarding the rejection or acceptance of pesticide imports.

The United States was the first to provide a list of banned or severely restricted pesticides in compliance with Prior Informed Consent (PIC) in 1992 for elimination from the world market. Since there is no enforcement regulation set up by FAO on pesticide trade The PIC procedure is just a formality that does not carry any consequences whatsoever. PIC is also rendered ineffective because the imported nations need the chemicals regardless of the hazardous effect (EPA 1992).

Pesticide Policies and Regulation in Canada

Canada, just like most developed nations manufacture, uses and trade pesticides to other nations, mostly developing nations. Over the years they have put in place policies for regulating the use and trade of pesticides. The Pest Control Products Act *(PCPA)* governs the registration, use, packaging, and labeling of pesticides. According to this Act any product *imported into, sold or used* in Canada must first be registered under the PCPA. The PCPA is administered by Health Canada through the Pest Management Regulatory Agency (PMRA) (Agriculture Canada 1994).

It is the PCPA's requirement that all pesticides used in Canada undergo review before registration by the PMRA, for environment, health and efficacy information. Precautionary symbols and words are legally required to be shown on the label of a pesticide product. The federal registration of products falls into four categories. A product may be registered into only one of these categories. In order of increasing hazard, these categories are:

- Domestic;
- Commercial (also referred to as: agricultural, industrial)
- Restricted;
- Manufacturing

The "manufacturing" product class is a technical grade or concentrate of the product. Such products may be sold for both end-use and manufacturing purposes but as such would require appropriate registration for both.

The types of registration status in Canada that are possible are:

- Never Registered (research permits must be obtained for research trials to be

conducted with a new unregistered product);

- Restricted;
- Discontinued (this action is also referred to as "voluntary withdrawal of registration" or "registration not renewed");
- Suspended this action bans distribution through wholesale trade by the registrant. Stock remaining in the retail market may be sold legally until the end of the given five year registration period); and,
- Canceled (a cancellation results in the immediate ban of all trade: wholesale, retail sale and use of the product and is the most severe regulatory action).

Both the active and end-use products must be federally registered. The "active ingredient" is the substance within the product, which controls the target pest. An "end-use product" contains the active ingredient plus various formulating ingredients. An active ingredient must be registered before an end-use product can be registered, although simultaneous registration of active and end-use products may occur.

An end-use product must have a registration for each of its individual uses and as a legal requirement; all permissible uses of an end-use product must be listed on the product label. For example, an end-use product that is registered for use solely on one crop cannot legally be used on any other crops. An application must be made by the registrant to amend the product registration for any additional crops. This applied to the use of the pesticide only, the reason behind this regulation is because the use of a pesticide (Estrin et al. 1993).

According to this act, all pest control products that are used in or imported into Canada must be registered under the Pest Control Products Act and regulations. The

Federal registration for all products with actives such as aldrin, dieldrin and chlordane were discontinued in 1990, because of their potential health hazards. This signifies that wholesale and retail sale of end-use products with these actives was permissible until 1995.

In 1990, when trade and use was still permissible for aldrin, dieldrin, and chlordane, notification of the registration status of chlorinated hydrocarbon insecticides was given to the Canadian Association of Pest Control Officials (CAPCO), Public Interest Groups and User Groups by Agriculture Canada in CAPCO Note 90-02. In 1990, remaining uses were restricted to use by licensed Pest Control Operators to control subterranean termites and provincial use permits were required in each of these instances. The following regulatory options were listed in this note:

- Cancellation of all registrations to stop sale and use of products;
- Suspension of all registrations to stop sale by registrants with a time frame for phase out of use; and,
- Discontinuation of all registrations at renewal on December 31, 1990 at the registrant's request with the exception of DDT, which was already discontinued as of December 1985.

The regulatory option pursued in Canada was cancellation of registrations as spelt out by Canadian act on pesticide regulation and according to guidelines set up by the international code of conduct on pesticide use and trade. Registration for **DDT** active and remaining end use products was discontinued in 1985. Wholesale and retail sale of DDT active and end-use products was thus permissible until 1990. But even when such

pesticides were prohibited for use in Canada, they were still exported out to developing nations where there is either no restriction or lack of enforcement.

Pesticide Policies in the European Union

The United Nations has tried to provide guidelines on the policies of pesticide trade through its subsidiaries. Other organizations both regional and state too have been active in this area. The European Community (EC) is one of those active regional organizations that have made efforts to formulate rules governing the registration of pesticide trade in order to bring uniformity to the international community.

The idea of working together on pesticide problems started in the late 1950s with the council of Europe. The council established a precedent for the handling of pesticide matters at the intergovernmental level in Western Europe. Outcomes of the decisions made by the council have not only affected Europe but also the international community on pesticide registration. Such decisions have impact on the international community is the set of guidelines on pesticide registration.

Guidelines set up by the EC are not binding on their member nations. However, most of the legislation on pesticides by states in the EC has been in line with guidelines set up by the United Nations Agencies such as FAO and WHO. One of such landmark decisions was 1962 and again in 1979 when the Public Health Committee drew up guidelines in 1978. In the resolution adopted national authorities were urged to consider including the publications topics such as safe handling, accidents and storage of pesticides. Other areas considered include minimizing of risk from the domestic use of pesticides; disposal of surplus pesticides and containers; the use of pesticides in the premises where food is produced, processed or stored; and the contamination of animal products for human

consumption that might result in pesticide residues.

Drawing up an agreement that is binding to all the European Community has been a difficult tusk. Some nations desire more due to the strong movement of environmentalists in their nations while others prefer more loose approach. In general policies and guidelines on the use and trade of pesticides in the Union are very much similar to those of other developed nations. There is a strong presence of companies manufacturing pesticides for domestic use and export. The European Union member nations are signatories to the United Nations Code of Conduct on Registration and use of Pesticides.

CHAPTER VII

SUMMARY, CONCLUSION AND RECOMMENDATION

Government policies and regulations seem to be similar in their set up but differ greatly in their implementation between developed and developing nations, as seen from the regulations set up in the United States, European Union and Canada on one side and those of Nigeria and Zimbabwe on the other. India seems to be between developed and developing nations. Both groups of nations seem to have in place policies and guidelines on the use of pesticides as provided by the international code of conduct on the use of pesticides. The major difference is from the manufacture and use. While developed nations manufacture, export and use these pesticides; developing nations mostly import and use these pesticides except India, which is deeply involved in manufacturing and use.

On the use, developed nations adhere to proper procedure for applying, storage and disposal of pesticides and the proper use of tools such as the sprayers and protective clothing. Developing country farmers do not follow such guidelines due to lack of proper education and resources.

In developed nations, method of disposing unused or expired pesticides is strictly enforced, while in developing nations enforcement is nonexistent and there are no facilities in place for the disposal.

Another area of major difference is that of banned pesticides. Pesticides that have

been banned in developed nations, due to health and environmental concerns are still in use in developing nations.

Education is another area of concern on the use of pesticides. While most farmers in developed nations have attained a minimum level of education that enables them read instructions and guidelines labeled on the containers on the use and proper application of pesticides, most farmers in developing nations are not literate, making it more difficult following application and disposal guidelines.

Many of the problems that have arisen through the use of pesticides, especially persistent pesticides are due to careless use of these chemicals. This is prevalent more in developing nations than in developed nations. The carelessness is a result of indiscriminate spraying to control weeds, insects, mosquitoes or other agricultural pests. Such sprays fall on all parts of an ecosystem and create environmental hazards to the ecosystem.

The structure and set up of who is responsible for implementing or enforcing the regulated policies differ greatly, for example, in the United States and Canada there is a single entity overseeing the overall aspect of pesticide trade use and enforcement. This is a standard that follows the guidelines set up by the international code of conduct on pesticide use. While in India pesticide use, manufacture and trade are controlled by different ministries and departments making it more difficult to control.

On labeling, farmers in developed nations are more educated than those in developing nations making it possible for them to read and understand directions for use on the labels and the ingredients of those chemicals. In developing nations most farmers do not know how to read and even when they do, the language of instruction on the labels showing the

direction of use is often different.

In developing nations the pressure to produce more far outweighs the risk to farmers of the effect of pesticides to their health, this leads farmers to indiscriminate purchasing policy without any due regards to the effect on their health.
Enforcement of pesticides is non-existent as government of developing nations tends to direct most of their efforts on enforcement to sectors like the security sectors.
Government of developing nations also focuses more on the end product for exportation to other nations to enable them to get more foreign exchange.

Extension services are also not adequate in developing nations as compared to developed nations. Farmers often use their reasoning in purchasing, using, and storing the pesticides and this creates health hazards for both farmers and consumers of the product.

In Nigeria, the existence of a large number of disparate legislation and policy documents directed at individual environmental or resource issues or problems are a major constraint to policy implementation. Inadequate/inaccurate data remains a major constraint to policy formulation, project planning and implementation in environmental and natural resources conservation in Nigeria. The inadequate and unsystematic inventory of Nigeria's natural resources is responsible for the dearth of detailed technical data that could be used to plan the management and national utilization of the resources.

Inadequate Enforcement: Apart from the inadequacy of both the policy and legal instruments, the enforcement of the existing environmental rules and regulations has been problematic especially as there is no clear demarcation of responsibilities between the Agency, Federal and State Ministries the inadequacy of the monitoring and enforcement mechanisms. Institutional Problems There is inadequate institutional capacity and inter-

sectoral communication and coordination to manage the environmental and resource management network throughout the country.

The major constraint to the implementation of these policies remains the financial provision for implementation. The average annual incremental costs of implementing environmental policies in developing nations have been estimated at 600 billion dollars out of which only 125 billion dollars or 25% is expected to be contributed by developed nations. This implies that a larger proportion of the money is to be sourced by the developing nations including Nigeria. The country's high debt servicing profile makes this impracticable. Currently, since about one-third of the annual budget goes into external debts servicing and external debt and other national priorities. Nigeria will continue to neglect problems associated with pesticides and other chemicals.

Accordingly, implementation of environmental concerns in Nigeria will require the assistance of relevant international, multilateral and bilateral agencies, such as the United Nations, the World Bank/IDA, the International Monetary Fund (IMF), and the Global Environmental Facility (GEF). Possible assistance options that may be considered by the IMF and the World Bank/IDA are the conversion of the country's debt service flows into investments in an environmental management and protection program and projects. Inadequately trained manpower in the area of integrated environmental management is a major constraint. Also, there is inadequate awareness on the importance of environment and natural resources management especially in a resource accounting.

Available technology in the country appears grossly inadequate to meet with the challenges of implementing of environmental program and transfer of technology is yet to take off fully. Inadequate public awareness, lack of appreciation and involvement of

the general public in environment related issues and development as well as insufficient popular participation in project design and implementation will for some time constrain the attainment of the goals of FEPA.

Conclusion

Policies in most developing nations currently restrict the use of some farm pesticides. However, there is needed for Nigeria and other developing nations to increase their effort in enforcing these policies. There exists already in developed nations such as the United States, Great Britain, and Canada, governmental machinery for controlling the marketing of pesticides. In the United States, for example, there are stringent regulations on pesticide manufacturers before they are allowed to market any pesticides, yet these same manufacturers find loopholes in regulations from developing nations for marketing pesticides to those nations.

Pesticide use has been on the increase in developing nations despite the international concern on the effect of these pesticides to the environment and the health of human beings. Efforts have been made by various governments to minimize the use of pesticides by reverting to traditional methods such as tillage, burning and crop rotation. New techniques such as the Integrated Pest Management and use of crop varieties with higher resistance, the current growths of use of crops are being encouraged.

The problem of most these efforts are that they are only on paper without little practical effort especially on the enforcement of the trade laws. Pesticides banned in developed nations that are responsible for most of the purchasing still find their way to Nigeria and most developing nations. Despite the introduction of prior informed consent (PIC), which requires manufacturers to inform the nations importing the pesticides that the pesticide

has been banned elsewhere.

The current unregulated practice of exporting chemicals to developing nations has yielded unfortunate consequences. Although the developed world feels the effects of pesticide trade, a majority of the detrimental impacts on human health and the environment afflict the developing world. Unfortunately, developing nations generally lack the resources, information and expertise to protect their people from dangerous chemical exports that are banned or severely restricted in developed nations. The incidence of pesticide exposure worldwide suggests that a major public health problem is not receiving the attention it deserves. New methods for estimating the true incidence of pesticide poisoning must be explored. The fact that exposure is almost exclusively in developing nations, even when pesticide consumption is so low in comparison to developed nations magnifies to problem and calls for major restructuring.

There is also a critical shortage of information on pesticide exposure, resulting in an inability to evaluate the true environmental and human health impacts of pesticides. Many developing nations do not keep track of exposure data, and those that do often fail to report the data to central organizations like the United Nations. There are indications of a worldwide pesticide exposure crisis, but there is little data to confirm or deny the conclusion. The situation can be associated with a patient who would rather not be examined for fear of hearing the news of a costly diagnosis. If reliable exposure data were available, perhaps there would be more interest in the problem leading to firm and decisive regulations.

There are concerted efforts being exerted by the international community on both manufacturers and importers on full disclosure of the dangers and proper use of

pesticides, this is because there is no single set of rules that can ensure the safe use of pesticides under every condition. Instruction and restriction apply to specific pesticides, formulations, application methods and commodities. Due to these problems, governments and industry alike should follow strict PIC procedures. Demanding well conduct on the part of industry in exchanging toxicological information between states, and having rules on trading, labeling, packaging, storage and disposal will have a beneficial impact. Training of pesticides workers on the use and effects of pesticides should be paramount to all concerned and industries should put greater company efforts to monitor pesticide use and come up with fewer harmful pesticides.

Currently there are no initiatives to curb pesticide trade problems in resolving exposure problems. And there is no firm commitment from the world's key chemical exporting nations to explore ways of curbing the problem. The voluntary nature of international law and regulation render them virtually unenforceable in today's lucrative international chemical market. Moreover, until the international market reflects a level economic playing field, powerful domestic lobbies will likely defeat initiatives on a legislative level. Incentives greater than money must exist before key chemical producing nations would submit to a convention mandating responsible trade. It will only take the understanding that there is loss in adverse effect of pesticides.

Governments of developing nations should double up their effort in educating farmers on the proper use of pesticides and the dangers of improper application and disposal. Enforcement that has been nonexistent should be carried out to ensure the safety of users and the environment.

Governments of developing nations should double up effort in encouraging farmers

through extension service to use alternatives to pesticides, such as the Integrated Pest Management (IPM), a method that combines several different pest control methods using synthetic pesticides with organic form of controlling pests. Proper cultivation of soil and rotation of crops where necessary.

Governments of developing nations should put in place proper inspection mechanisms for inspecting imported pesticides at the port of entry to ensure that banned pesticides are not imported. Laws on the trade and use of pesticides within the country should be enforced according to the policies and regulations set up by the country.

With the current guidelines set up by the FAO, WHO and other international organization manufacturers will continue to take advantage of the loopholes and violate the laws since there is no international penalty on the trade and use of pesticides. Manufacturers also are aware of weaker laws in developing nations and will continue to take advantage of the weaknesses unless policies are put in place to curb the illegal trafficking of pesticides.

Recommendations

One approach certain to bring responsibility to pesticide trade is to outlaw or severely restrict the export of those pesticides that developed nations have banned, withdrawn registration to, or severely restricted. Furthermore, pesticides that have not been registered could also be included among those outlawed for export.

Future plans for strengthening, improving and coordinating the implementation of environmental and pesticide management should be geared towards the farmer's safety on handling these chemicals. Training of extension agents should be intensified and

emphasis on the training should include how to properly use and store pesticides. The environmental protection agency should harmonize federal, states and local governments in environmental management by:

- Adopting and promoting the use of existing environmentally friendly technologies;
- Promoting research and development of environmentally sound technologies;
- Managing environmental information and education to generate adequate public awareness for use and effect of use;
- Increasing education of farmers on the use and effects of pesticides;
- Making sure labels on pesticide containers are written in the farmers' language.

To improve the proper use and trade of pesticides and increase environmentally sound management and practices, FEPA and other responsible organizations will have to enforce environmentally friendly practices in Nigeria throughout the country in states and local government areas. This enforcement should be carried out in the rural areas where farms are located. To achieve this FEPA will have to expand the fundamental objectives and state policy in the constitution to include the clause on sustainable development as a national goal and government should ensure speedy translation of international agreement protocols and conventions on environment and consignation into national laws and regulations and ensure their enforcement.

To ensure optimum use of limited technical and financial resources and to achieve optimum results in meeting the national goals and guidelines for pesticide use and sustainable development, federal, state and local Governments in Environmental Management should evaluate its established environmental quality standards, regulatory

guidelines and procedures for implementing, enforcing and evaluating them beyond what they have establish so far, especially in the areas of enforcement. FEPA should also evaluate established guidelines and procedures for project and pesticide policy assessment and environmental impact assessment as well as the necessary capacity to initiate and review them. Consistent guidelines for state pesticide and the coordination of national and interstate programs, projects and exchanges of information on pesticide; federal policies, which might have significant adverse impacts on the pesticides or natural resource base, should also be reviewed. FEPA should also continue to collect, analyze and distribute data of relevance to environmental impact assessment policy analysis and environmental monitoring within the country.

Finally, for Nigeria and other developing nations to continue to maintain high level of agricultural productivity and to continue to promote high quality and readily available food produce, which consumers demand, farmers will continue to rely on pesticides. However, it must be recognized that there continues to be concern about these same pesticides that are so important in production of their effects on the environment and human health.

Pesticide regulation, therefore, must continue to be the focus of the Federal Environmental agency of Nigeria and other developing nations. The agency responsible for training and education must continue to train extension personnel to educate the farmers using these pesticides on the handling and better application procedures for using pesticides. Enforcement of banned pesticides should be intensified to reduce the dangers it poses to the environment and human health. FEPA and other developing nations should insist on labeling in the language that farmers understand. Protective clothing should be

tested to conform to the climatic conditions of where they are to be used.

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